Final
Baseline Environmental Investigation Report
Chemical Defense Training Facility,
Parcels 126Q-CWM, 62(2), 59(7), and 104(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK07, IT Corporation (IT) conducted a baseline environmental investigation at the Chemical Defense Training Facility (CDTF), Parcels 126Q-Chemical Warfare Material (CWM), 62(2), 59(7), and 104(7) at Fort McClellan, Calhoun County, Alabama. The objectives of the investigation were to determine the baseline environmental condition of the CDTF, and to determine if CDTF operations have impacted environmental media (i.e., surface, subsurface, and depositional soil, surface water, sediment, and groundwater).

IT collected 17 surface soil samples, 13 subsurface soil samples, 6 groundwater samples, 2 depositional soil samples, 1 surface water sample, and 1 sediment sample during the baseline environmental investigation at the CDTF, Parcel 126Q-CWM. Samples were analyzed for volatile organic compounds, semivolatile organic compounds (SVOC), metals, and organophosphorus pesticides. In addition, the CDTF operating contractor performed air monitoring for CWM inside Building 4482.

IT installed six monitoring wells in the residuum groundwater at the CDTF, Parcel 126Q-CWM, to collect groundwater samples and to provide data for characterizing the geology and hydrogeology of the site.

Analytical data from media sampled at the CDTF, Parcel 126Q-CWM were compared to background concentrations, residential and recreational site user human health site-specific screening levels (SSSL), and ecological screening values (ESV). The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing baseline environmental investigations being performed under the Base Realignment and Closure (BRAC) environmental restoration program at Fort McClellan. Additionally, metals concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (Science Applications International Corporation, 1998), and SVOC concentrations exceeding SSSLs and ESVs in surface and depositional soils were compared to polynuclear aromatic hydrocarbon background screening values, where available.

There were not any organophosphorus pesticides detected in site media at concentrations exceeding human health and ESVs. The SVOC bis(2-ethylhexyl)phthalate was detected in the

surface water sample at a concentration above the ESVs. However, bis(2-ethylhexyl)phthalate is a known laboratory artifact and was detected in the associated method blank, which indicates that its presence was due to either field sampling or laboratory bias. The volatile organic compound trichlorofluoromethane was detected in the sediment sample at a concentration exceeding ESVs. Trichloro-fluoromethane was not used in any known processes at the CDTF, but was formerly used as a propellant for fire extinguishers.

Several metals were detected in surface soil, subsurface soil, depositional soil, and groundwater at concentrations exceeding background concentrations and residential human health and ESVs. With the exception of lead in some of the surface and depositional soil samples, there does not appear to be a well-defined spatial distribution of metals detected in any site media. Six of eleven surface soil samples collected in the vicinity of Buildings 4483 (Incinerator) and 4484 (Waste Treatment and Operations and Maintenance) contained lead above background and ESVs. However, lead values for surface soil samples from the CDTF are within the same order of magnitude as the background surface soil samples. Furthermore, viable ecological habitat at the CDTF is expected to be minimal and thus the lead concentrations detected are not reasonably expected to pose a significant ecological threat.

Metals concentrations in groundwater are related to high turbidity field readings and are the same order of magnitude as background metals values. It should be noted, however, that high turbidity (>100 nephelometric turbidity units) was encountered in four of the six samples at the time of collection which can result in elevated metals concentrations. However, the overall impact to groundwater at the CDTF is negligible and the potential threat to human health is expected to be very low.

IT recommends “No Further Action” in terms of additional investigations or remedial actions by the Army at the CDTF, Parcels 126Q-CWM, 62(2), 59(7), and 104(7). However, due to the fact that this property was used for chemical warfare training purposes, the Army should consider placing restrictions on future site activities and land use that may result in human exposures to these substances.

1.0 Introduction

The U.S. Department of the Army (U.S. Army) has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510 established the process by which the Department of Defense (DOD) installations would be closed or realigned. The BRAC environmental restoration program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the baseline environmental investigation of the Chemical Defense Training Facility (CDTF), Parcels 126Q-Chemical Warfare Material (CWM), 62(2), 59(7), and 104(7) (designated in this report hereafter as Parcel 126Q-CWM), under Contract Number DACA21-96-D-0018, Task Order CK07.

This baseline environmental investigation report has been prepared to present specific information and results compiled from the field investigations, including field sampling and analysis and monitoring well installation activities conducted at the CDTF, Parcel 126Q-CWM.

1.1 Project Description

The CDTF was identified as an area to be investigated prior to property transfer. The CDTF, Parcel 126Q-CWM was classified as a qualified Category 1 site in the Environmental Baseline Survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 1 sites are sites where there was not any storage, release, or disposal (including migration) occurring but which have a non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) issue present. The non-CERCLA issue determined for the CDTF, Parcel 126Q-CWM was the presence of CWM.

A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment were finalized in May 1999 (IT, 1998a). The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the CDTF, Parcel 126Q-CWM. The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b), and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan (QAP).

The baseline environmental investigation included fieldwork to collect 17 surface soil samples, 13 subsurface soil samples, 6 groundwater samples, 2 depositional soil samples, 1 surface water sample, and 1 sediment sample.

1.2 Purpose and Objectives

The CDTF is scheduled to be transferred to the Department of Justice, Center for Domestic Preparedness. Prior to property transfer, a baseline environmental investigation was performed to determine the baseline environmental condition of the CDTF, and to determine if facility operations have impacted soils, surface waters, or groundwater. The baseline environmental investigation program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the CDTF at concentrations that would present an unacceptable risk to human health or the environment. The conclusions of the baseline environmental investigation in Chapter 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with baseline environmental investigations being performed under the BRAC environmental restoration program at FTMC. The SSSLs, ESVs, and polynuclear aromatic hydrocarbon (PAH) background screening values are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). The PAH background screening values were developed by IT at the direction of the BRAC Cleanup Team to address the occurrence of PAH compounds in surface soils as a result of anthropogenic activities at FTMC. Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

Air monitoring for CWM in Building 4482, performed by the CDTF operating contractor, provides supplemental information for determining the baseline environmental condition of the CDTF.

Based on the conclusions presented in this baseline environmental investigation report, the BRAC Cleanup Team will decide to propose “No Further Action” at the site or to conduct additional work at the site.

1.3 Site Description and History

The CDTF is located in the north-central portion of the Main Post of FTMC (Figure 1-1). The facility, which covers approximately 8 acres (Figure 1-2), has been in use since 1987 and is currently an active, high-security facility. Trainees move from one bay to another in the Training Building (4482) performing CWM detection, identification, and decontamination exercises using standard Army equipment. The chemicals used at this site include nerve agents sarin (GB) and VX (O-ethyl-S-[2-diisopropylaminoethyl]methylphosphonothiolate), caustic bleach, Decontamination Solution No. 2 (DS2), calcium hypochlorite (HTH), silver fluoride, silver nitrate, and buffer solutions. Radioactive sources (americium-241 and nickel-63), used in Army CWM detection equipment, are also stored at the CDTF. GB and VX are the only CWMs used at this facility and their use is confined to the CDTF Training Building 4482, "Hot Area" (ESE, 1998). CWM are completely contained within the Training Building by design. No CWM releases outside the training building have occurred.

Six primary buildings are located at the CDTF site (Figure 1-2) and include the following:

- Guardhouse Building (4480)
- Administrative Building (4481)
- Training Building (4482) and Filter Pad Building (4479)
- Incinerator Building (4483)
- Waste Treatment and Operation and Maintenance (O&M) Building (4484)
- Facility Storage Building.

Except for the facility storage building, which was constructed in 1998, each of these buildings was built during the initial construction of the CDTF and is still used for its original purpose. However, the Administrative Building (4481) has been modified and upgraded to better accommodate the work staff.

The Guardhouse Building (4480) is manned for security purposes 24 hours a day, 7 days a week. Items stored at the Guardhouse Building include:

- Guard's personal items
- Security supplies
- One M43A1 Chemical Agent Alarm with an americium-241 source.

The Administrative Building (4481) is used for administrative functions as well as for instructional lectures and mask fitting of soldiers. Items stored at the Administrative Building include:

- Administrative supplies
- Janitorial supplies
- Military personnel personal items
- Accumulated mercuric cyanide
- M43A1 Chemical Agent Alarms with americium-241 sources
- Training supplies
- Stannic chloride
- Amyl acetate (banana oil)
- Silver nitrate
- Sulfur
- Sulfuric acid
- Isopropylamine.

Student training is accomplished in the Training Building and Filter Pad Building (4479), using nerve agents in life-like, practical scenarios. This building was designed to train 3,500 to 5,000 military personnel per year in toxic chemical agent decontamination procedures. Binary chemical agents are currently used and DS2 is employed in the decontamination procedures. The building, which is operated under negative pressure, contains seven chemical agent training bays (Roy F. Weston, Inc. [Weston], 1990). Contaminated air from the training bays is passed through charcoal filters prior to release through the stack. Items stored in the Training Building and at the Filter Pad Building include:

- Training supplies
- Medical supplies
- Janitorial supplies
- Administrative supplies for Safety Control
- Laboratory supplies
- M43A1 Chemical Agent Alarms with americium-241 sources
- Liquid bleach (decontaminating agent)
- HTH (calcium hypochlorite, dry or granular bleach, decontaminating agent)
- DS2 (decontaminating agent)
- Mask filters (no whetlerite)
- Nerve agents GB and VX (not to exceed 1 liter total GB and VX)
- Binary precursors QL and OF
- Stannic chloride
- Amyl acetate (banana oil)
- Charcoal filters
- Cooling Tower treatment
- Lithium bromide (chiller cooling medium)
- Chemical agent monitors (CAM) with nickel-63 sources

- Acetone
- Hydrogen
- Carbon disulfide
- Hydrogen sulfide.

Air handling filters (intake filters) clean air before the air enters the CDTF Training Building, and there is little possibility of these filters being exposed to CWM. Spent air handling filters are disposed of in the on-site incinerator. Induced draft filters scrub the air before release through the filter stack. The filters contain activated carbon generated from coconut-based charcoal (no chromium used in the manufacture). Spent filters are documented free of CWM and then pyrolized for 15 minutes at 1000 degrees Fahrenheit (^{o}F) prior to disposal.

Five mockup training stations (similar to the training bays in the Training Building) are located east of the Training Building (4482) and are used by personnel to demonstrate decontamination procedures without using CWM. CWM is only used in the chemical agent training bays inside of the Training Building. CWM are completely contained within this building by design. No CWM releases outside the training building have occurred.

The Incinerator Building (4483), Parcel 104(7) contains the incinerator, pyrolyzer, and autoclave. The incinerator is used to destroy liquid waste, solid wastes, and gases at a temperature of greater than 1700^{o}F. Heat from the incinerator goes through the boiler, which generates steam for use within the CDTF.

Operation of the Incinerator, Parcel 104(7) began in 1987 and continues to date. The incinerator treats nonhazardous wastewater, personnel protective clothing, and other solid waste (e.g., plastic, paper, rubber, glass, and metal) generated during decontamination training exercises (ESE, 1998). The incinerator is fueled by natural gas (fuel oil previously) and operates under a state air permit. The solid residue (ash) is drummed and sent to the FTMC industrial landfill for disposal. Approximately 3,600 pounds of ash are disposed of in the Industrial Landfill annually (ESE, 1998). Ash generated from the Incinerator is tested semiannually for toxicity characteristic leaching procedure (TCLP) metals.

Canister carbon filters containing chromium are the only hazardous waste processed in the CDTF incinerator. These filters are incinerated solely for the purpose of chemical agent decontamination. The filters are incinerated at 1000^{o}F for 15 minutes and then drummed. The carbon filters are characteristically hazardous for chromium and are properly managed as hazardous waste and shipped to an off-site hazardous waste landfill.

The pyrolyzer, located in Building 4483, is used to destroy all solid nonhazardous waste and bring the previously chemical agent-contaminated materials (3X level) to a temperature of 1000°F for 15 minutes (5X level), which is necessary to release from government control. The autoclave, also located in Building 4483, is used to steam-clean the 3X battle dress over-garments at 250°F and 15 pounds per square inch. This enables the government to reuse the battle dress overgarments up to four times.

The term 3X indicates the materials, equipment, and facilities have been decontaminated by approved procedures and contamination cannot be detected. The items or facilities are considered safe for the intended use. However, items decontaminated to this degree cannot be furnished to qualified DOD or industry users or subjected directly to open flame cutting, welding, high temperature, or operations unless other conditions are specifically met (U.S. Army, 1978). The term 5X indicates the equipment or facilities have been completely decontaminated, are free of hazards, and may be released for general use or to the general public (U.S. Army, 1978).

Items stored at the Incinerator Building include:

- Lawn and grounds equipment
- 20 gallons of gasoline for equipment
- Oil for equipment
- 5X ash.

The Waste Treatment and O&M Building (4484) houses operation and maintenance functions and boiler treatment and water treatment operations. Items stored at the Waste Treatment and O&M Building include:

- Janitorial supplies
- Administrative supplies for O&M
- O&M tools, equipment, and supplies
- 3X material
- Bleach, DS2, and laundry supplies
- Boiler and water treatment supplies

- Salt
- Caustic (two 55-gallon drums for the scrubber)
- 3X ash
- 20,000-gallon wastewater storage tank
- 40,000-gallon soft water storage tank to which one 55-gallon drum of caustic is added for scrubber liquid.

The Facility Storage Building, which was constructed in 1998, is used to store training aids. Items stored in the Facility Storage Building include:

- 3X training aids
- Training supplies
- Laundry supplies.

Forty-five americium-241 sources, containing a total of 250 microcuries of radioactivity, are used in the M43A1 Chemical Agent Monitors (CAM); 29 nickel-63 sources, containing a total of 10 microcuries of radioactivity, are used in the CAMs.

Operating procedures at the CDTF are as follows:

- Small amounts of GB and VX are manufactured on site from the binary precursors. The resulting chemical agents are stored in locked vaults within this complex.
- Students are issued clothing (including undergarments) to wear into the "Hot Area" of the CDTF Training Building during CWM training. Clothing is monitored after use in specially designed holding bins using real-time, low-level monitors after personnel exit the "Hot Area" to ensure decontamination.
- Training aids (various materials and equipment) are contaminated with a small amount of CWM.
- Trainees move from one bay to another in the Training Building performing detection, identification, and decontamination exercises using standard U.S. Army equipment.
- The decontaminating agent of choice for the U.S. Army is DS2; the U.S. Marine Corps uses bleach, and the U.S. Navy uses HTH.

- Personnel decontamination procedures include:
  - A specific doffing procedure is used, followed by a hot rinse shower, then a regular shower.
  - Equipment and rubber items are placed in monitoring bins and then undergo a wash with soap and hot water (180^{o}F).
  - BDOs (carbon impregnated) are autoclaved after each use. BDOs are used four times, and then incinerated.
- All waste generated within the "Hot Area" is incinerated at the CDTF Incinerator.
- Each of the seven training bays has a drainage trench that flows into a common trench and then into a sump in Training Bay No. 7. Liquids from the sump are pumped to a 20,000-gallon tank via overhead pipes. Wastewater is sent to the Incinerator and analysis is performed to confirm compliance with Alabama Department of Environmental Management (ADEM) criteria for incineration.
- Water in the 20,000-gallon tank is analyzed for CWM and then incinerated. The incinerator is fired with natural gas and can burn 200 gallons per hour.
- Approximately 3,600 pounds of ash from the CDTF incinerator are disposed of in the FTMC Industrial Landfill annually.
- A small amount of caustic is stored on site to prepare a dilute mixture (55 gallons in 4,000 gallons of water) for scrubbers and soft water treatment.

Four aboveground storage tanks (AST) are located at the CDTF site (Figure 1-2). The EBS lists Parcel 62(2) for all four of these ASTs. Three of the ASTs were located within a concrete berm southwest of the Waste Treatment and O&M Building (4484). However, one of the ASTs is a 4,000-gallon tank that previously held sulfuric acid, but had been empty for several years and was moved to store diesel fuel on the east side of the Training Building (4482). Sulfuric acid is no longer used at the CDTF. The second AST is a 4,000-gallon tank that currently holds a caustic soda solution. Both of these tanks had lines that fed into a third AST, a 20,000-gallon wastewater tank. The wastewater tank contains liquid decontamination wastes generated in the CDTF Training Building. The fourth AST, located northwest of Building 4484, is an empty 40,000-gallon fuel oil tank. This AST was used to supply fuel to the incinerator prior to the CDTF switching to natural gas. There are no immediate plans to remove or replace the remaining three ASTs (ESE, 1998).

A 5,000-gallon heating oil underground storage tank (UST), Parcel 59(7), was located at Building 4482 at the CDTF. This UST was removed September 17, 1998. The UST was found in good condition and was not leaking. All removed soil was returned to the excavation (Reisz, 1998). This UST was closed in accordance with ADEM guidelines (see Chapter 2.0).

Only one leak has occurred at the CDTF. The sulfuric acid and caustic tanks were originally manifolded to the same 2-inch pipe for transfer of chemicals to the 20,000-gallon wastewater tank. This transfer line began leaking at a point within the containment area during transfer of sulfuric acid. A small volume of acid (approximately 1 quart) leaked and was subsequently neutralized and cleaned up. The CDTF no longer uses sulfuric acid and the AST has been moved near the east side of the Training Building and now contains diesel fuel.

The average elevation at the CDTF site is approximately 915 feet (National Geodetic Vertical Datum of 1929). Soils at this site are composed of the Anniston and Allen Series soils. The Anniston and Allen Series of soils consists of strongly acid, deep, well-drained soils that have developed in old local alluvium. The parent material washed from the adjacent higher-lying Linker, Muskingum, Enders, and Montevallo soils, which developed from weathered sandstone, shale, and quartzite. These soils contain sandstone and quartzite gravel and cobbles, which measure as much as 8 inches in diameter on the surface and throughout the soil (U.S. Department of Agriculture [USDA], 1961).

An intermittent stream is located on the northeast perimeter of the CDTF and flows to the northwest. This intermittent stream eventually discharges into Cave Creek near Cemetery Hill.

2.0 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with DOD guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by seven criteria:

1. Areas where no storage, release, or disposal (including migration) has occurred
2. Areas where only storage has occurred
3. Areas of contamination below action levels
4. Areas where all necessary remedial actions have been taken
5. Areas of known contamination with removal and/or remedial action underway
6. Areas of known contamination where required response actions have not been taken
7. Areas that are not evaluated or require further evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, the U.S Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels. The CDTF was identified as a site where further evaluation was needed.

A 5,000-gallon heating oil UST, Parcel 59(7), was located at Building 4482 at the CDTF. This UST was removed on September 17, 1998. The UST was in good condition and was not leaking. Soil samples were collected from the floor of the excavation and from a stockpile of excavated soil and were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl

benzene, and xylenes (BTEX). The sample results (Table 2-1) indicated that TPH and BTEX concentrations in the excavation were below ADEM guidelines; therefore, the UST removal and the excavation were approved by ADEM for closure. The removed soil was returned to the excavation (Reisz, 1998). An exploratory direct-push soil boring was also installed next to the excavation. Refusal was encountered at approximately 25 feet below ground surface (bgs) and groundwater was not encountered before reaching refusal. Samples were not collected from the direct-push boring for chemical analysis (Reisz, 1998). Based on the available history of the site, this is the only investigation that has been performed at the CDTF site.

Weston (1990) identified the following areas as having the potential to be contaminated at the CDTF site (ESE, 1998):

- Air filtration system: spent carbon from the filters for the Training Building is treated in the on-site incinerator.

- Decontamination operations wastewater collection sump: 800-gallon sump receives rinse water from the decontamination operations. The sump is epoxy-coated and enclosed within the Training Building on the north side of the building. This sump water is piped to the holding tank.

- Laboratory wastewater collection sump: receives rinse water from the laboratory during daily operations. The sump is epoxy-coated and enclosed within the Training Building. This sump is piped to the decontamination operation sump previously described and subsequently to the holding tank.

- Wastewater holding tank: stainless-steel aboveground 20,000-gallon holding tank.

- Used equipment storage bay: this storage bay is used to store protective garments that have been worn in training exercises. Garments are decontaminated and stored at this location prior to disposal in the Incinerator.

- CDTF Incinerator: used for incineration of wastewater, protective garments, and activated carbon filters.

During the EBS site visit, CDTF personnel indicated that the entire interior of the Training Building where CWM is manufactured (from binary components), stored, or used should be considered contaminated (ESE, 1998).

This site is a parcel where various types of materials, equipment, vehicles, hazardous materials,

Table 2-1

Sample Data from the Removal of the 5,000-Gallon UST at Building 4482, Parcel 59(7)
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Bldg No.	Sample ID No.	Sample Location	Sample Date	TPH-418.1 mg/kg	Benzene µg/kg	Ethyl Benzene µg/kg	Toluene µg/kg	Xylenes µg/kg
4482	UST-1	Excavation Floor	9/17/1998	12	<5	<5	<5	<5
4482	UST-2	Excavation Floor	9/17/1998	18	<5	<5	<5	<5
4482	UST-3	Excavation Floor	9/17/1998	89	<5	<5	<5	<5
4482	UST-4	Excavation Floor	9/17/1998	65	<5	<5	<5	<5
4482	UST-5	Stockpile	9/17/1998	<10	<5	<5	<5	<5

µg/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.
TPH - Total petroleum hydrocarbons.
UST - Underground storage tank.

and hazardous wastes have been used, generated, stored, and treated. All CWM have been contained within the Training Building and, therefore, CWM analysis of media outside the building is unnecessary. Other hazardous materials (non-CWM), however, may possibly have been released onto the site or to the environment. The CDTF lacked adequate documentation for these materials and, therefore, required additional evaluation to determine the baseline environmental condition of the parcel.

3.0 Baseline Environmental Investigation Activities

3.1 Environmental Sampling

The environmental sampling performed during the baseline environmental investigation at the CDTF, Parcel 126Q-CWM, included the collection of surface soil samples, depositional soil samples, subsurface soil samples, surface water and sediment samples, and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics noted during a site walkover, and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analyses of site related parameters listed in Section 3.3.

In addition to the sampling and analysis of site media, the current CDTF operating contractor, EG&G Technical Services, Inc. (EG&G), conducted air monitoring for CWM within Building 4482 of the CDTF using Miniature Chemical Agent Monitors (MINICAMS). The air monitoring was performed in accordance with DA PAM 385-61 and CDTF Standard Operating Procedure, Section R (Lin, 1999).

3.1.1 Surface and Depositional Soil Sampling

Surface soil samples were collected from 17 locations and depositional soil samples were collected from 2 locations at the CDTF, Parcel 126Q-CWM. Soil sampling locations and rationale are presented in Table 3-1. Sampling locations are shown on Figure 3-1. Sample designations and quality assurance/quality control (QA/QC) samples are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried utilities.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil by either direct-push technology or with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9 of the SAP (IT, 2000a). Depositional soil samples were collected from the upper 1 foot of soil with a stainless-steel trowel. Surface and depositional soil samples were collected by first removing surface debris, such as rocks and vegetation, from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.5 of the SAP (IT, 2000a). Samples for volatile organic compound (VOC) analyses were collected directly from the sampler with three EnCore® samplers. The remaining portion of the sample was transferred to a clean

Table 3-1

Sampling Locations and Rationale
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
CDTF-126Q-GP01	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the east side of the Incinerator Building 4483.
CDTF-126Q-GP02	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the north side of the Incinerator Building 4483.
CDTF-126Q-GP03	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the west side of the Incinerator Building 4483.
CDTF-126Q-GP04	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected near the northeast corner of the Waste Treatment and Operation and Maintenance (O&M) Building 4484.
CDTF-126Q-GP05	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the north side of the Waste Treatment and O&M Building 4484.
CDTF-126Q-GP06	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the north side of the former 40,000-gallon fuel oil aboveground storage tank (AST).
CDTF-126Q-GP07	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected south of the Waste Treatment and O&M Building 4484.
CDTF-126Q-GP08	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the east side of the AST concrete berm southwest of the Waste Treatment and O&M Building 4484.
CDTF-126Q-GP09	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the north side of the AST concrete berm southwest of the Waste Treatment and O&M Building 4484.
CDTF-126Q-GP10	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the west side of the AST concrete berm southwest of the Waste Treatment and O&M Building 4484.
CDTF-126Q-GP11	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the south side of the AST concrete berm southwest of the Waste Treatment and O&M Building 4484.
CDTF-126Q-GP12	Surface Soil	A surface soil sample was collected on the east side of the Chemical Defense Training Facility (CDTF) in the Buffer Zone south of the road.
CDTF-126Q-GP13	Surface Soil	A surface soil sample was collected on the north side of the CDTF in the Buffer Zone.
CDTF-126Q-GP14	Surface Soil	A surface soil sample was collected on the west side of the CDTF in the Buffer Zone.
CDTF-126Q-GP15	Surface Soil	A surface soil sample was collected on the south side of the CDTF in the Buffer Zone on the north side of a stream.
CDTF-126Q-GP16	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the north side of the 4000-gallon diesel AST and the excavation for the 5000-gallon diesel underground storage tank.
CDTF-126Q-GP17	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected on the east side of the 4000-gallon diesel AST near the Facility Storage Building.
CDTF-126Q-DEP01	Depositional Soil	A depositional soil sample was collected from the drainage area on the west side of the CDTF north of CDTF-126Q-DEP02.
CDTF-126Q-DEP02	Depositional Soil	A depositional soil sample was collected from the drainage area on the west side of the CDTF north of the parking lot.

Table 3-1

Sampling Locations and Rationale
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
CDTF-126Q-SW/SD01	Surface Water Sediment	Surface water and sediment samples were collected from the intermittent stream on the north end of the CDTF.
CDTF-126Q-MW01	Groundwater	A permanent monitoring well was installed downgradient of the sump in Training Building 4482. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CDTF-126Q-MW02	Groundwater	A permanent monitoring well was installed downgradient of the Filter Stack and Filter Pad at Building 4485. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CDTF-126Q-MW03	Groundwater	A permanent monitoring well was installed downgradient and near the northwest corner of the of the CDTF. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CDTF-126Q-MW04	Groundwater	A permanent monitoring well was installed downgradient and west of the CDTF in the Buffer Zone. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CDTF-126Q-MW05	Groundwater	A permanent monitoring well was installed upgradient and southeast of the of the CDTF in the Buffer Zone. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CDTF-126Q-MW06	Groundwater	A permanent monitoring well was installed downgradient of the Filter Stack and Filter Pad at Building 4485. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum.

Table 3-2

Surface Soil, Subsurface Soil, and Depositional Soil Sample Designations and QA/QC Sample Quantities
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
CDTF-126Q-GP01	CDTF-126Q-GP01-SS-BK0001-REG	0-1.0	CDTF-126Q-GP01-SS-BK0002-FD	CDTF-126Q-GP01-SS-BK0003-FS		TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP01-DS-BK0004-REG	4.0-8.0				
CDTF-126Q-GP02	CDTF-126Q-GP02-SS-BK0005-REG	0-1.0			CDTF-126Q-GP02-SS-BK0005-MS	TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP02-DS-BK0006-REG	8.0-12.0			CDTF-126Q-GP02-SS-BK0005-MSD	
CDTF-126Q-GP03	CDTF-126Q-GP03-SS-BK0007-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP03-DS-BK0008-REG	8.0-12.0				
CDTF-126Q-GP04	CDTF-126Q-GP04-SS-BK0009-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP04-DS-BK0010-REG	8.0-12.0				
CDTF-126Q-GP05	CDTF-126Q-GP05-SS-BK0011-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP05-DS-BK0012-REG	8.0-12.0				
CDTF-126Q-GP06	CDTF-126Q-GP06-SS-BK0013-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP06-DS-BK0014-REG	8.0-12.0				
CDTF-126Q-GP07	CDTF-126Q-GP07-SS-BK0015-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP07-DS-BK0016-REG	8.0-12.0				
CDTF-126Q-GP08	CDTF-126Q-GP08-SS-BK0017-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP08-DS-BK0018-REG	8.0-12.0				
CDTF-126Q-GP09	CDTF-126Q-GP09-SS-BK0019-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP09-DS-BK0020-REG	8.0-12.0				
CDTF-126Q-GP10	CDTF-126Q-GP10-SS-BK0021-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP10-DS-BK0022-REG	8.0-12.0				
CDTF-126Q-GP11	CDTF-126Q-GP11-SS-BK0023-REG	0-1.0	CDTF-126Q-GP11-SS-BK0024-FD	CDTF-126Q-GP11-SS-BK0025-FS		TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP11-DS-BK0026-REG	8.0-12.0				
CDTF-126Q-GP12	CDTF-126Q-GP12-SS-BK0027-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-GP13	CDTF-126Q-GP13-SS-BK0028-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-GP14	CDTF-126Q-GP14-SS-BK0029-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-GP15	CDTF-126Q-GP15-SS-BK0030-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-GP16	CDTF-126Q-GP16-SS-BK0031-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP16-DS-BK0032-REG	4.0-7.0				
CDTF-126Q-GP17	CDTF-126Q-GP17-SS-BK0033-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
	CDTF-126Q-GP17-DS-BK0034-REG	4.0-8.0				
CDTF-126Q-DEP01	CDTF-126Q-DEP01-DEP-BK0035-REG	0-1.0	CDTF-126Q-DEP01-DEP-BK0036-FD			TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-DEP02	CDTF-126Q-DEP02-DEP-BK0037-REG	0-1.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides

FD - Field duplicate.
FS - Field split.
ft. bgs - Feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

stainless steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3. Sample collection logs are included in Appendix A.

3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from 13 soil borings, shown on Figure 3-1, at the CDTF, Parcel 126Q-CWM. Subsurface sampling locations and rationale are presented in Table 3-2. Subsurface soil sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings were advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3.

Soil samples were collected continuously to 12 feet bgs or until direct-push sampler refusal was encountered. Subsurface soil samples were field screened using a PID in accordance with Section 4.5 of the SAP (IT, 2000a) to measure samples for volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis, however at those locations where PID readings were not greater than background, the deepest sample interval above the saturated zone was submitted for analyses. Samples to be analyzed for VOCs were collected directly from the sampler with three EnCore® samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Samples submitted for laboratory analyses are summarized in Table 3-2. The on-site geologist constructed a detailed boring log for each soil boring. The lithological log for each borehole is included in Appendix B.

At the completion of soil sampling, boreholes were abandoned with hydrated bentonite chips following borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000a).

3.1.3 Well Installation

Six monitoring wells were installed in the residuum groundwater at the CDTF, Parcel 126Q-CWM, to collect groundwater samples for laboratory analyses. The well/groundwater sample locations are shown on Figure 3-1. Table 3-3 summarizes the construction details of the wells installed at the CDTF, Parcel 126Q-CWM. The well construction logs are included in Appendix B.

IT contracted Miller Drilling, Inc., to install the residuum monitoring wells with a hollow-stem auger rig in July 1999 at the well/groundwater sample locations shown on Figure 3-1. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The boreholes at these locations were advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. A 2-foot long, 2-inch inside diameter carbon steel split spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes continued the lithological log for each borehole from the depth of direct-push sampler refusal to the bottom of the auger borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth, a 10- to 20-foot length of 2-inch ID, 0.010-inch continuous wire-wrap, Schedule 40 polyvinyl chloride (PVC) screen with a 3-inch PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A number 1 filter sand was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The wells were surged approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite chips, was placed immediately on top of the filter sand and hydrated with potable water. If the bentonite seal was installed below the water table surface, the bentonite chips were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). Cement grout was tremied in the annular space from the top of the bentonite seal to ground surface. A protective steel casing was installed over the PVC well casing and the well head was completed with 2-foot by 2-foot by 4-inch-thick concrete well pad.

Table 3-3

Monitoring Well Construction Summary
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Monitoring Well	Northing	Easting	Ground Elevation (ft msl)	TOC Elevation (ft msl)	Well Depth (ft bgs)	Screen Length (ft bgs)	Screen Interval (ft bgs)	Sump Interval (ft bgs)	Well Material
CDTF-126Q-MW01	1175741.27	676633.66	912.02	911.84	23.0	10.0	13 - 23	NA	2" ID Sch. 40 PVC
CDTF-126Q-MW02	1175645.39	676475.22	915.77	915.58	64.5	20.0	41.4 - 61.4	61.4 - 64.5	2" ID Sch. 40 PVC
CDTF-126Q-MW03	1176018.98	676455.43	893.34	896.31	15.0	10.0	3 - 13	13 - 15	2" ID Sch. 40 PVC
CDTF-126Q-MW04	1175908.01	676285.15	901.11	904.33	36.5	20.0	16.5 - 36.5	NA	2" ID Sch. 40 PVC
CDTF-126Q-MW05	1175261.60	677091.35	927.00	929.55	39.7	20.0	16.7 - 36.7	36.7 - 39.7	2" ID Sch. 40 PVC
CDTF-126Q-MW06	1175659.02	676474.16	915.92	915.53	28.0	15.0	10 - 25	25 - 28	2" ID Sch. 40 PVC

All monitoring wells installed with an auger drill rig using a 4 1/4-inch hollow-stem auger.
Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum (NAD83), 1983.
Elevations were referenced to the North American Vertical Datum of 1988 (NAVD88).
2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
bgs - Below ground surface.
ft - Feet.
msl - Mean sea level.
TOC - Top of casing.
NA - Not applicable. No sump installed.

Monitoring wells CDTF-126Q-MW01, CDTF-126Q-MW02, and CDTF-126Q-MW06 were completed with a boltdown, driveover, flush-to-grade steel protective well casing. At these wells, a locking well cap was placed on the PVC well casing. Monitoring wells CDTF-126Q-MW03, CDTF-126Q-MW04, and CDTF-126Q-MW05 were completed with 2.5-foot-high steel protective well casings. At these wells, the protective well casings were secured with a lock.

The monitoring wells were developed in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). Development was performed by surging and pumping with a 2-inch Grundfos® Redi-Flo II® submersible pump or by bailing if groundwater recharge was insufficient to sustain pumping. Development continued until the water turbidity was equal to or less than 20 nephtholometric turbidity units or for a maximum of 8 hours. The well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in the monitoring wells at the CDTF, Parcel 126Q-CWM on November 5, 1999 following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned between use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements is presented in Table 3-4.

3.1.5 Groundwater Sampling

Groundwater was sampled from the six monitoring wells at the CDTF, Parcel 126Q-CWM in August 1999. The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC sample quantities are listed in Table 3-5.

Sample Collection. Groundwater sampling was performed following procedures outlined in Section 4.9 of the SAP (IT, 2000a). Groundwater was sampled after purging a minimum three well volumes and field parameters including temperature, pH, specific conductivity, oxidation-reduction potential (redox), and turbidity stabilized. Purging and sampling were performed with a Fultz® positive gear displacement pump equipped with Teflon® tubing. Field parameters were measured using a Hydrolab® water quality unit. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Section 3.3.

Table 3-4

Groundwater Elevations
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft msl)	Ground Elevation (ft msl)	Groundwater Elevation (ft msl)
CDTF-126Q-MW01	5-Nov-99	8.01	911.84	912.02	903.83
CDTF-126Q-MW02	5-Nov-99	19.92	915.58	915.77	895.66
CDTF-126Q-MW03	5-Nov-99	9.67	896.31	893.34	886.64
CDTF-126Q-MW04	5-Nov-99	35.42	904.33	901.11	868.91
CDTF-126Q-MW05	5-Nov-99	17.31	929.55	927.00	912.24
CDTF-126Q-MW06	5-Nov-99	15.24	915.53	915.92	900.29

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

BTOC - Below top of casing.
ft - Feet.
msl - Mean sea level.

Table 3-5

Groundwater Sample Designations and QA/QC Sample Quantities
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
CDTF-126Q-MW01	CDTF-126Q-MW01-GW-BK3001-REG	13.19 - 23.0	CDTF-126Q-MW01-GW-BK3002-FD	CDTF-126Q-MW01-GW-BK3003-FS		TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-MW02	CDTF-126Q-MW02-GW-BK3004-REG	57.93 - 61.4			CDTF-126Q-MW02-GW-BK3004-MS CDTF-126Q-MW02-GW-BK3004-MSD	TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-MW03	CDTF-126Q-MW03-GW-BK3005-REG	11.69 - 13.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-MW04	CDTF-126Q-MW04-GW-BK3006-REG	30.14 - 36.5				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-MW05	CDTF-126Q-MW05-GW-BK3007-REG	29.11 - 36.7				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides
CDTF-126Q-MW06	CDTF-126Q-MW06-GW-BK3008-REG	15.85 - 25.0				TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides

FD - Field duplicate.
FS - Field split.
ft. bgs - Feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

Table 3-6

Groundwater Field Parameters
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Date	Media	Specific Conductivity (umhos/cm)	Dissolved Oxygen (ppm)	Redox Potential (mV)	Temperature (^{o}C)	Turbidity (NTUs)	pH (Std units)
CDTF-126Q-MW01	3-Aug-99	GW	0.166	1.35	75.0	22.2	7.9	5.7
CDTF-126Q-MW02	5-Aug-99	GW	0.036	8.16	167.0	22.3	1116.0	4.9
CDTF-126Q-MW03	5-Aug-99	GW	0.202	2.23	166.0	22.1	976.0	5.7
CDTF-126Q-MW04	5-Aug-99	GW	0.302	4.22	159.0	20.2	608.0	5.8
CDTF-126Q-MW05	5-Aug-99	GW	0.099	3.35	129.0	21.4	330.0	5.8
CDTF-126Q-MW06	3-Aug-99	GW	0.129	1.16	240.0	22.1	1.1	5.1

^{o}C - Degrees Celsius.
GW - Groundwater.
umhos/cm - Micromhos per centimeter.
mV - Millivolts.
NTUs - Nephelometric turbidity units.
ppm - Parts per million.
Std units - Standard units.
SW - Surface water.

3.1.6 Surface Water Sampling

One surface water sample was collected from the intermittent stream at the northeast corner of the site. The water sample location is shown on Figure 3-1. The surface water sampling location and rationale are listed in Table 3-1. The surface water sample designation and QA/QC samples are listed in Table 3-7. The sampling locations were determined in the field, based on drainage pathways and actual field observations.

Sample Collection. The surface water sample was collected in accordance with the procedures specified in Section 4.9.1.3 of the SAP (IT, 2000a). The sample was collected by dipping a stainless-steel pitcher in the water and pouring the water into the appropriate sample containers. The sample collection log is included in Appendix A. The sample was analyzed for the parameters listed in Section 3.3.

3.1.7 Sediment Sampling

One sediment sample was collected from the same location as the surface water sample presented in Section 3.1.6 (Figure 3-1). The sediment sampling location and rationale are listed in Table 3-1. The sediment sample designation and QA/QC samples are listed in Table 3-7. The sampling location was determined in the field, based on drainage pathways and actual field observations.

Sample Collection. Sediment sampling was conducted in accordance with the procedures outlined in Section 4.9.1.2 of the SAP (IT, 2000a). The sediment sample was collected with a stainless-steel trowel. Sediment to be analyzed for VOCs was collected directly from the trowel using three Encore® samplers. The remaining portion of the sediment was transferred to a stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The sample collection log is included in Appendix A. The sample was analyzed for the parameters listed in Section 3.3.

3.2 Surveying of Sample Locations

New sample locations were surveyed using global positioning system survey techniques described in Section 4.2.5 of the SAP (IT, 2000a), and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum (NAD83), 1983. Elevations were referenced to the North American Vertical Datum of 1988 (NAVD88). Horizontal coordinates and elevations are included in Appendix D.

Table 3-7

Surface Water and Sediment Sample Designations and QA/QC Sample Quantities
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples		
			Field Duplicates	Field Splits	MS/MSD
CDTF-126Q-SW/SD01	CDTF-126Q-SW/SD01-SW-BK2001-REG	NA			
	CDTF-126Q-SW/SD01-SD-BK1001-REG	0-0.5			

FD - Field duplicate.
FS - Field split.
ft. bgs - Feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list
TOC - Total organic carbon.
VOC - Volatile organic compound.

Table 3-7

Surface Water and Sediment Sample Designations and QA/QC Sample Quantities
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Analytical Suite
TCL VOCs, TCL SVOCs, TAL Metals, Organophosphorus Pesticides

3.3 Analytical Program

Samples collected during the baseline environmental investigation were analyzed for various chemical and physical properties. The specific suite of analyses performed is based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Samples collected from the CDTF, Parcel 126Q-CWM, were analyzed for the following parameters:

- Target Compound List (TCL) VOCs - Method 5035/8260B
- TCL Semivolatile Organic Compounds (SVOC) - Method 8270C
- Target Analyte List Metals - Method 6010B/7000
- Organophosphorus Pesticides – Method 8141A.

The samples were analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 6-1 in Appendix B of the SAP (IT, 2000a). Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard copy data packages by the laboratory using Contract Laboratory Program-like forms. These packages were validated in accordance with EPA National Functional Guidelines by Level III criteria. A summary of validated data is included in Appendix E. The Data Validation Summary Report is included as Appendix F.

3.4 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this baseline environmental investigation are listed in Section 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain of custody were recorded as specified in Section 4.13 of the SAP (IT, 2000a).

Completed analysis request and chain of custody records were secured and included with each shipment of sample coolers to Quanterra Environmental Services in Knoxville, Tennessee. Split samples were shipped to USACE South Atlantic Division Laboratory in Marietta, Georgia.

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed of as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated from the field sampling at the CDTF, Parcel 126Q-CWM, was segregated as follows:

- Drill cuttings
- Purge water from well development and sampling activities, and decontamination fluids
- Spent well materials, and personal protective equipment (PPE).

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined rolloff bins prior to characterization and final disposal. Solid IDW was characterized using TCLP analyses. Based on the results, drill cuttings, spent well materials, and PPE generated during the baseline environmental investigation at the CDTF, Parcel 126Q-CWM, were disposed as non-regulated waste at the industrial waste landfill on the Main Post of FTMC.

Liquid IDW was contained in a 500-gallon polyethylene tank prior to characterization and disposal. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

3.6 Variances/Nonconformances

3.6.1 Variances

Four variances to the SFSP were recorded during the completion of the baseline environmental investigation at the CDTF, Parcel 126Q-CWM. The variances did not alter the intent of the investigation or the sampling rationale presented in Table 4-2 of the SFSP (IT, 1998a). The variances to the SFSP are summarized in Table 3-8 and included in Appendix G.

3.6.2 Nonconformances

There were not any nonconformances to the SFSP recorded during the completion of the baseline environmental investigation at the CDTF, Parcel 126Q-CWM.

Table 3-8

Variances to the Site-Specific Field Sampling Plan
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Variance to the SFSP	Justification for Variance	Impact to Site Investigation
Groundwater monitoring well CDTF-126Q-MW03 was relocated approximately 160 feet south-southeast of its proposed location. Groundwater monitoring well CDTF-126Q-MW04 was relocated approximately 100 feet east/southeast of its proposed location.	Moving the wells closer to the CDTF saved money because a substantial amount of tree and vegetation removal was needed to give drill rig access to the proposed well locations.	The wells were relocated closer, downgradient, and were successfully installed for development and sampling.
Two groundwater monitoring wells, CDTF-126Q-MW02 and CDTF-126Q-MW06, were installed downgradient of the filter stack and filter pad which are located adjacent to Building 4489.	CDTF-126Q-MW02 was installed with 20 feet of screen at a total depth of 64.5 feet below ground surface in an attempt to straddle the water table because the exact level of the water table was not known. CDTF-126Q-MW06 was installed with 15 feet of screen to a depth of 28 feet below ground surface. The two wells were installed to provide water level data and water quality data of two discrete groundwater-bearing zones observed in residuum during installation of CDTF-126Q-MW02.	Drilling two monitoring wells at different depths downgradient of the potential contamination source allowed more accurate determination of groundwater quality in the residuum aquifer.
Monitoring well CDTF-126Q-MW06 was constructed with 15 feet of polyvinyl chloride (PVC) well screen. CDTF-126Q-MW02, CDTF-126Q-MW04, CDTF-126Q-MW05 were constructed with 20 feet of PVC screen.	The monitoring wells were constructed with 15- and 20-foot screen lengths in an attempt to straddle the water table.	Well construction with 15- and 20-foot screen lengths allowed successful access of the water table so the wells could be properly developed and sampled.
The subsurface soil sample at CDTF-126Q-GP11 was collected approximately 10 feet north of the surface soil sample location.	The subsurface soil sample at CDTF-126Q-GP11 was relocated because an underground utility line was present approximately 2 feet below ground surface.	The subsurface soil sample was successfully collected 10 feet south of the surface soil sample location.

3.7 Data Quality

The field sample results data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the work plan; the FTMC SAP and QAP; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of these samples were reviewed and organized for this report and are included in Appendix A. As discussed in Section 3.6, there were not any variances or nonconformances identified either in the field or during the review of sample collection logs that may have impacted the usability of the data.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that was prepared to discuss the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC ITEMS database for tracking and reporting. The qualified data were used in comparison to background metals concentrations and SSSLs developed by IT. Rejected data (assigned an "R" qualifier) were not used in the background and SSSL comparison of this parcel.

The data presented in this report, except where qualified, meet the principle data quality objective for this baseline environmental investigation.

3.8 Continuous Air Monitoring for CWM

Continuous air monitoring was performed at Building 4482 on August 16 through August 18, 1999. Air monitoring was performed by EG&G, the current CDTF operating subcontractor, at nine stations within Building 4482. EG&G used MINICAMS calibrated for GB to a time weighted average (TWA) level of 0.0001 milligrams per cubic meter (mg/m^3), and for VX to a TWA of 0.00001 mg/m^3. Documentation of the air monitoring is included as Appendix H. The cover letter of this documentation incorrectly states that the air monitoring was performed at Building 4484. This should say Building 4482 (the Training Building contains the nine stations that were monitored).

4.0 Site Characterization

Subsurface investigations performed at the CDTF, Parcel 126Q-CWM provided soil, bedrock, and groundwater data. These data were used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold and thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold and thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted with major structures and faults striking in a northeast-southwest direction. North-westward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992), and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated, greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of

siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The undifferentiated unit is comprised of coarse-grained and fine-grained units. The coarse-grained facies appear to dominate the unit and consists primarily of coarse-grained, vitreous quartzite, and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consists of sandy and micaceous shale and silty, micaceous mudstone which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation east and north of the Main Post and consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne 1999, personal communication).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962), (Osborne and Szabo, 1984). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded

to laminated, siliceous dolomite and dolomitic limestone that weathers to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area and a significant portion of the northwestern corner of the Main Post.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and other parts of Calhoun County. The Athens Shale overlies the Ordovician Limestone units. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites and limestones, and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish-gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Szabo et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian Age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician sequence comprising the Eden thrust sheet is exposed at FTMC through an eroded "window" or "fenster" in the overlying thrust sheet. Rocks within the window display complex folding with the folds being overturned, and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome and Conasauga formations, north by the Knox Group, northeast and east by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1989).

4.1.2 Site Geology

Soils at this site fall into the Anniston and Allen stony loams, 0 to 10 percent slopes (AdC). This mapping unit has a surface layer that is a very dark brown to dark grayish-brown stony loam, 6 to 10 inches thick. Below this is a dark-red or dark reddish-brown upper subsoil of stony fine sandy clay loam. These soils are permeable, have medium infiltration, and have a high capacity for moisture (USDA, 1961).

The CDTF is located between the Jacksonville Fault to the west and a splay of the fault to the east. The splay fault is located less than 1,000 feet east of the site. Bedrock underlying the parcel is mapped as the Cambrian Shady Dolomite. Bedrock east of the splay fault consists of the undifferentiated Cambrian age Chilhowee Group (Osborne et al., 1989).

Based on direct-push and hollow-stem auger boring data collected during the investigation, soils beneath the CDTF, Parcel 126Q-CWM consist of predominantly clayey to silty sand with sandstone and chert gravel alluvium/colluvium to depths of 12 feet bgs across the northwestern one-third of the site. The alluvium overlies yellowish-orange, very stiff to hard, massive, clayey silt, which was logged to a depth of 34.5 feet at CDTF-126Q-MW04. A very hard chert underlies the silt to a depth of 36.5 feet, where auger refusal was encountered.

Soils in the central to southeastern corner of the CDTF consist of reddish brown clay and silt residuum and fill material with some sand and little gravel to depths of 6 to 24 feet bgs. These soils overlie red to purple, hard, silt to severely weathered shale across the majority of the site. This material may be the shale beds described for the lower Shady Dolomite (Cloud, 1966;

Osborne and Szabo, 1984) but visually resembles the shale described for the Rome Formation. The contact between the residuum and the weathered shale was usually gradational. Based on hollow-stem auger refusal, hard, competent bedrock was encountered at depths ranging from 23 feet at CDTF-126Q-MW01 to 65 feet bgs at CDTF-126Q-MW02. A geologic cross section was constructed with boring log data from Parcel 126Q and is presented in Figure 4-1. The geologic cross section location is shown on Figure 3-1.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama with infiltration rates annually exceeding evapotranspiration rates. However, from July 1998 through December 1998, rainfall totals were approximately 10 inches below average for the period (National Oceanic and Atmospheric Administration, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

An unnamed tributary of Cave Creek enters the CDTF area from the east. The creek is diverted to the north around the facility by a manmade ditch and continues on to the west-northwest. A secondary tributary discharges to the main creek on the east side of the site. The creek eventually discharges to Cave Creek approximately one-half mile west of the site. Surface drainage is directed to the creek by storm drains and overland flow.

4.2.2 Hydrogeology

During boring and well installation activities, groundwater was generally encountered within two water-bearing zones. Wells CDTF-126Q-MW01, CDTF-126Q-MW03, CDTF-126Q-MW05, and CDTF-126Q-MW06 were completed within the shallow groundwater-bearing zone within the weathered shale/siltstone where groundwater was encountered at depths of 6 to 23 feet bgs (approximately 887 to 895 feet above mean sea level [msl]). Monitoring wells CDTF-126Q-MW02 and CDTF-126Q-MW04 were completed on top of competent bedrock at depths of 65 feet and 36.5 feet, respectively. During drilling, groundwater was encountered at depths of 54 feet bgs (approximately 862 feet above msl) at CDTF-126Q-MW02 and 34 feet bgs (approximately 867 feet above msl) at CDTF-126Q-MW04.

Static water levels were measured in the monitoring wells on November 5, 1999. Table 3-4 summarizes measured groundwater elevations at the CDTF, Parcel 126Q-CWM. A groundwater elevation map for the shallow saturated zone, constructed from data from November 1999, is shown on Figure 4-2. This figure shows the potentiometric surface generally mimicking the land surface. Groundwater flow at the site is to the northwest with a hydraulic gradient across the site of approximately 0.03 feet per foot (ft/ft). A downward vertical gradient of 0.14 ft/ft was calculated from the well cluster downgradient of the filter stack, CDTF-126Q-MW02 and CDTF-126Q-MW06.

5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at the CDTF, Parcel 126Q-CWM indicate that metals, VOCs, and SVOCs have been detected in site media. Organophosphorous pesticides were not detected in any of the samples. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, detected constituent concentrations were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the on-going site investigations being performed under the BRAC environmental restoration program at FTMC.

Metal concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values (background concentrations) (SAIC, 1998) (Appendix I) to determine if the metals concentrations were below natural background concentrations. Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix I. Additionally, SVOC concentrations in surface and depositional soils that exceeded the SSSLs and ESVs were compared to PAH background screening values, where available. The PAH background screening values were derived from PAH analytical data from 18 parcels at FTMC that were determined to represent anthropogenic activity (IT, 2000c). PAH background screening values were developed for two categories of surface soils: beneath asphalt and adjacent to asphalt. The PAH background screening values for soils adjacent to asphalt are the more conservative (i.e., lower) of the PAH background values and are the values used herein for comparison.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), including 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit of 0.005 milligrams per kilogram (mg/kg), while Method 8270C has a reporting limit of 0.330 mg/kg, which is typical for a soil matrix sample. Due to the direct nature of the Method 8260B analysis and its resulting lower reporting limit, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. Method 8270C and its associated methylene chloride extraction step is superior, however, when dealing with samples that contain higher concentrations (greater than 0.330 mg/kg) of these compounds. Therefore, all data were considered and none were categorically excluded. Data

validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations reported (e.g., whether concentrations were less than or greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more accurate result. This evaluation was conducted for naphthalene for which results were reported from both methods.

The following sections and Tables 5-1 through 5-5 summarize the results of the comparison of detected constituents to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix E.

5.1 Surface and Depositional Soil Sample Results

Seventeen surface soil samples and two depositional soil samples were collected for chemical analyses at the CDTF, Parcel 126Q-CWM. Surface soil samples were collected from the upper 1-foot interval of soil at various locations across the parcel and depositional soil samples were collected near storm drain culverts to the west of the fenced area of the CDTF. Sample locations are shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and background screening values (metals and PAHs), as presented in Table 5-1.

5.1.1 Metals

Eleven metals, including beryllium, cadmium, calcium, copper, chromium, iron, lead, magnesium, nickel, selenium, and zinc were detected in surface and depositional soils at concentrations exceeding background concentrations at the CDTF, Parcel 126Q-CWM. Copper (one location), chromium (one location), iron (two locations), lead (eight locations), selenium (three locations), and zinc (three locations), were detected at concentrations exceeding background concentrations and ESVs. With the exception of lead, there does not appear to be any evident spatial distribution or association of these metals. Six of the eight lead results exceeding background and ESVs were from samples collected in the vicinity of Buildings 4483 (Incinerator) and 4484 (Waste Treatment and O&M) within the fenced portion of the CDTF.

IT also compared the lead results from the baseline environmental investigation to the range of lead values of background surface soil samples determined by SAIC (1998). The results of 70 background surface soil samples as determined by SAIC (1998), indicate that background lead concentrations in surface soils range from 2.9 to 83 mg/kg (Appendix I). As summarized in

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-DEP01 BK0035 24-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	CDTF-126Q CDTF-126Q-DEP02 BK0037 24-Jun-99 Start depth = 0 End depth =1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	4.73E+03					YES	6.40E+03					YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	2.80E+00				YES		4.70E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	6.11E+01						3.59E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	3.70E-01	B	B				4.20E-01	B	J			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	2.95E+03		J	YES			1.66E+03		J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	8.30E+00				YES	YES	1.21E+01				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	4.00E+00	B	J				7.40E+00					
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	1.20E+01						9.20E+00					
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	8.93E+03				YES	YES	1.43E+04				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	3.04E+01		J				6.00E+01			YES		YES
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	4.47E+02	B	J				4.44E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	4.02E+02				YES	YES	4.67E+02				YES	YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	3.90E-02	B	J				6.00E-02					
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	4.10E+00	B	J				4.30E+00	B	J			
Potassium	8.00E+02	Essential Nutrient		no data	no data	4.18E+02	B	J				3.80E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	6.40E-01	B	J	YES			6.10E-01	B	J	YES		
Sodium	6.34E+02	Essential Nutrient		no data	no data	1.71E+02	B	B				1.30E+02	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	ND						ND					
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	1.29E+01					YES	2.02E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.04E+02		J	YES		YES	3.19E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	4.20E-02		B				1.70E-02	J	B			
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	1.10E-02	B	B				1.00E-02	B	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	1.10E-02						4.30E-03	J	J			
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	8.70E-03	J	J				8.30E-03	J	J			

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP01 BK0001 22-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	CDTF-126Q CDTF-126Q-GP02 BK0005 21-Jun-99 Start depth =0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	8.70E+03		J		YES	YES	9.90E+03		J		YES	YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	3.90E+00				YES		3.50E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	7.21E+01						5.49E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	5.30E-01	B	B				4.20E-01	B	J			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						9.70E-01			YES		
Calcium	1.72E+03	Essential Nutrient		no data	no data	6.95E+02		J				1.35E+03		J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	9.40E+00				YES	YES	1.32E+01				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	3.30E+00	B	J				3.70E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	2.31E+01		J	YES			3.69E+01		J	YES		
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	1.21E+04				YES	YES	1.08E+04				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	7.79E+01		J	YES		YES	1.33E+02		J	YES		YES
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	3.97E+02	B	J				3.64E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	4.82E+02				YES	YES	5.51E+02				YES	YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	3.80E-02		J				3.80E-02					
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	7.20E+00						1.14E+01			YES		
Potassium	8.00E+02	Essential Nutrient		no data	no data	2.70E+02	B	J				3.12E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	ND						ND					
Sodium	6.34E+02	Essential Nutrient		no data	no data	7.89E+01	B	B				1.65E+02	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	ND						4.60E-01	B	B			
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	2.08E+01					YES	1.89E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.65E+01		J				1.23E+02		J	YES		YES
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	5.30E-02	J	J				ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	3.80E-02	J	J				ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	4.20E-02	J	J				ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	ND						ND					
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	3.80E-03	JB	B				4.30E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	ND						3.50E-03	JB	J			

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP03 BK0007 21-Jun-99 Start depth =0 End depth = 1						CDTF-126Q CDTF-126Q-GP04 BK0009 21-Jun-99 Start depth = 0 End depth = 1					
						mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	1.37E+04		J		YES	YES	8.42E+03		J		YES	YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	4.90E+00				YES		7.50E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	2.69E+01						2.96E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	4.00E-01	B	B				3.70E-01	B	B			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	7.22E+02		J				4.31E+02	B	J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	1.52E+01				YES	YES	1.68E+01				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	2.80E+00	B	J				1.70E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	8.70E+00		J				8.60E+00		J			
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	1.51E+04				YES	YES	1.89E+04				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	1.30E+01		J				2.67E+01		J			
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	3.45E+02	B	J				2.78E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	3.94E+02				YES	YES	1.55E+02					YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	4.40E-02						3.50E-02	B	J			
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	5.50E+00						3.90E+00	B	J			
Potassium	8.00E+02	Essential Nutrient		no data	no data	2.97E+02	B	J				3.26E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	ND						7.10E-01			YES		
Sodium	6.34E+02	Essential Nutrient		no data	no data	1.04E+02	B	B				5.97E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	ND						ND					
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	3.07E+01					YES	3.01E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	2.06E+01		J				1.07E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	ND						ND					
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						1.20E-03	J	J			
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	4.10E-03	JB	B				4.20E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	ND						ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP05 BK0011 22-Jun-99 Start depth = 0 End depth = 1						CDTF-126Q CDTF-126Q-GP06 BK0013 22-Jun-99 Start depth = 0 End depth = 1					
						mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	6.30E+03		J			YES	8.74E+03		J		YES	YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	3.30E+00				YES		1.06E+01				YES	YES
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	4.31E+01						5.09E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	4.90E-01	B	B				7.90E-01					
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	6.08E+02		J				9.96E+02		J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	8.80E+00				YES	YES	3.74E+01			YES	YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	2.40E+00	B	J				4.30E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	7.89E+01		J	YES		YES	2.79E+01		J	YES		
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	9.50E+03				YES	YES	4.25E+04			YES	YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	8.33E+01		J	YES		YES	7.83E+01		J	YES		YES
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	2.21E+02	B	J				4.62E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	4.04E+02				YES	YES	4.99E+02				YES	YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	2.80E-02	B	J				2.50E-02	B	J			
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	5.70E+00						1.14E+01			YES		
Potassium	8.00E+02	Essential Nutrient		no data	no data	1.69E+02	B	J				2.40E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	ND						ND					
Sodium	6.34E+02	Essential Nutrient		no data	no data	6.79E+01	B	B				6.15E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	3.80E-01	B	B				ND					
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	1.71E+01					YES	3.07E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.55E+01		J				3.70E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	ND						ND					
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	3.50E-03	JB	B				4.00E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	ND						ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP07 BK0015 22-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	CDTF-126Q CDTF-126Q-GP08 BK0017 22-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	7.18E+03		J			YES	8.93E+03		J		YES	YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	2.90E+00				YES		4.10E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	6.44E+01						7.30E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	5.70E-01		B				4.60E-01	B	B			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	4.21E+02	B	J				7.83E+02		J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	7.90E+00				YES	YES	1.07E+01				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	3.00E+00	B	J				4.70E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	4.32E+01		J	YES		YES	2.84E+01		J	YES		
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	9.82E+03				YES	YES	1.20E+04				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	1.79E+02		J	YES		YES	5.47E+01		UJ	YES		YES
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	2.75E+02	B	J				4.37E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	4.63E+02				YES	YES	1.21E+03				YES	YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	3.50E-02	B	J				3.00E-02	B	J			
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	9.70E+00						6.80E+00					
Potassium	8.00E+02	Essential Nutrient		no data	no data	3.80E+02	B	J				5.40E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	ND						ND					
Sodium	6.34E+02	Essential Nutrient		no data	no data	6.73E+01	B	B				6.02E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	6.40E-01	B	B		YES		1.10E+00		B		YES	YES
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	1.47E+01					YES	2.01E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.84E+01		J				2.48E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	8.70E-03	J	B				5.70E-03	J	B			
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	5.80E-03	B	B				4.60E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	5.00E-03	J	J				3.40E-03	J	J			

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP09 BK0019 22-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	CDTF-126Q CDTF-126Q-GP10 BK0021 23-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	7.07E+03		J			YES	7.77E+03					YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	3.40E+00				YES		4.90E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	4.45E+01						2.62E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	4.20E-01	B	B				2.80E-01	B	B			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	1.90E+03		J	YES			7.91E+03		J	YES		
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	1.07E+01				YES	YES	1.32E+01				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	2.70E+00	B	J				2.60E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	1.25E+01		J				1.14E+01					
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	1.28E+04				YES	YES	1.38E+04				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	3.96E+01		J				2.95E+01					
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	4.13E+02	B	J				2.70E+03			YES		
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	3.64E+02				YES	YES	2.77E+02					YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	2.10E-02	B	J				3.90E-02					
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	5.60E+00						5.40E+00					
Potassium	8.00E+02	Essential Nutrient		no data	no data	5.78E+02						4.68E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	5.40E-01	B	J	YES			6.00E-01			YES		
Sodium	6.34E+02	Essential Nutrient		no data	no data	7.41E+01	B	B				9.40E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	ND						8.50E-01	B	B		YES	
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	1.93E+01					YES	2.56E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.72E+01		J				1.72E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						4.50E-02	J	J			
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	ND						ND					
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	5.00E-03	JB	B				5.10E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	3.30E-03	J	J				ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP11 BK0023 23-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	CDTF-126Q CDTF-126Q-GP12 BK0027 24-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	9.90E+03				YES	YES	5.08E+03					YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	5.20E+00				YES		2.00E+00					
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	1.93E+01	B	J				5.43E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	2.80E-01	B	B				2.40E-01	B	B			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	9.89E+02		J				3.64E+02	B	J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	1.18E+01				YES	YES	5.90E+00				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	2.10E+00	B	J				3.00E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	5.60E+00						4.30E+00					
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	1.58E+04				YES	YES	5.98E+03				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	1.88E+01						1.78E+01					
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	3.08E+02	B	J				2.27E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	2.09E+02					YES	2.83E+02					YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	5.00E-02						3.00E-02	B	J			
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	4.80E+00						2.50E+00	B	J			
Potassium	8.00E+02	Essential Nutrient		no data	no data	4.53E+02	B	J				2.20E+01	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	6.90E-01			YES			5.90E-01	B	J	YES		
Sodium	6.34E+02	Essential Nutrient		no data	no data	5.56E+01	B	B				6.86E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	4.80E-01	B	B				ND					
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	3.19E+01					YES	1.04E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.13E+01		J				1.60E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	ND						1.70E-02	J	B			
Acetone	NA	7.76E+02	NA	no data	2.50E+00	ND						3.90E-01		J			
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	5.40E-03	JB	B				8.30E-03	B	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						2.10E-02		J			
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	ND						3.00E-03	J	J			

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP13 BK0028 24-Jun-99 Start depth = 0 End depth =1						CDTF-126Q CDTF-126Q-GP14 BK0029 24-Jun-99 Start depth = 0 End depth = 1					
						mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	7.00E+02					YES	5.32E+03					YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	5.20E+00				YES		2.60E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	9.94E+01						4.71E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	5.30E-01	B	B				3.40E-01	B	B			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	1.01E+03		J				3.65E+02	B	J			
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	2.95E+01				YES	YES	7.10E+00				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	3.30E+00	B	J				3.90E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	1.54E+01			YES			4.80E+00					
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	2.34E+04				YES	YES	8.75E+03				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	7.56E+01			YES		YES	1.52E+01					
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	2.54E+02	B	J				4.54E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	6.06E+02				YES	YES	9.01E+02				YES	YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	5.00E-02						3.40E-02	B	J			
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	3.60E+00	B	J				4.60E+00	B	J			
Potassium	8.00E+02	Essential Nutrient		no data	no data	2.45E+02	B	J				4.18E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	1.40E+00			YES		YES	ND					
Sodium	6.34E+02	Essential Nutrient		no data	no data	1.10E+02	B	B				7.76E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	5.50E-01	B	B		YES		6.20E-01	B	B		YES	
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	2.94E+01					YES	1.28E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	2.35E+01		J				1.33E+01		J			
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	8.70E-03	J	B				ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	2.20E-01		J				7.10E-02		B			
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	1.00E-02	B	B				8.00E-03	B	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	1.20E-02	J	J				7.00E-03	J	J			

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP15 BK0030 24-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL	CDTF-126Q CDTF-126Q-GP16 BK0031 23-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals																	
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	6.49E+03					YES	5.70E+03					YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	2.20E+00						1.09E+01				YES	YES
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	5.22E+01						7.22E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	6.10E-01	B	J				1.10E+00			YES		
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND						ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	1.44E+02	B	J				5.55E+03		J	YES		
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	7.10E+00				YES	YES	1.37E+01				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	1.03E+01						9.90E+00					
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	4.60E+00						1.06E+01					
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	8.34E+03				YES	YES	4.26E+04			YES	YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	1.69E+01						4.26E+01			YES		
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	3.21E+02	B	J				3.09E+02	B	J			
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	2.98E+02					YES	1.28E+03				YES	YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	5.80E-02	B	J				6.40E-02					
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	3.70E+00	B	J				1.39E+01			YES		
Potassium	8.00E+02	Essential Nutrient		no data	no data	3.13E+02	B	J				2.82E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	8.50E-01	B	J	YES		YES	2.00E+00			YES		YES
Sodium	6.34E+02	Essential Nutrient		no data	no data	7.98E+01	B	B				9.43E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	ND						1.20E+00		B		YES	YES
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	1.32E+01					YES	3.73E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	1.41E+01		J				5.34E+01		J	YES		YES
Semivolatile Organic Compounds																	
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND						ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND						ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND						ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND						ND					
Volatile Organic Compounds																	
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	1.70E-02	J	B				ND					
Acetone	NA	7.76E+02	NA	no data	2.50E+00	4.20E-01		J				ND					
Bromomethane	NA	1.09E+01	NA	no data	no data	ND						ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	1.40E-02	B	B				4.70E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND						ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	1.60E-02	J	J				ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values[b] Resident Noncancer SSSL (mg/kg)	Human Health Screening Values[b] Resident Cancer SSSL (mg/kg)	Ecological Screening Values[b] USEPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-GP17 BK0033 23-Jun-99 Start depth = 0 End depth = 1 mg/kg	Qual	ValQual	>background	>HHSSSL	>ECOSSSL
Metals											
Aluminum	1.63E+04	7.80E+03	NA	5.00E+01	- -	3.00E+03					YES
Arsenic	1.37E+01	2.34E+00	4.26E-01	1.00E+01	- -	3.10E+00				YES	
Barium	1.24E+02	5.47E+02	NA	1.65E+02	- -	7.96E+01					
Beryllium	8.00E-01	9.60E+00	NA	1.10E+00	- -	2.40E-01	B	B			
Cadmium (solid media)	2.80E-01	6.25E+00	NA	1.60E+00	- -	ND					
Calcium	1.72E+03	Essential Nutrient		no data	no data	1.76E+05		J	YES		
Chromium	3.70E+01	2.32E-01	NA	4.00E-01	- -	7.40E+00				YES	YES
Cobalt	1.51E+01	4.68E+02	NA	2.00E+01	- -	1.80E+00	B	J			
Copper	1.27E+01	3.13E+02	NA	4.00E+01	- -	3.60E+00					
Iron	3.42E+04	2.34E+03	NA	2.00E+02	- -	7.98E+03				YES	YES
Lead	4.00E+01	4.00E+02	NA	5.00E+01	- -	5.30E+00					
Magnesium	1.03E+03	Essential Nutrient		no data	4.40E+05	8.74E+02					
Manganese	1.58E+03	3.63E+02	NA	1.00E+02	- -	1.61E+02					YES
Mercury	8.00E-02	2.33E+00	NA	1.00E-01	- -	2.00E-02	B	J			
Nickel	1.03E+01	1.54E+02	NA	3.00E+01	- -	3.80E+00	B	J			
Potassium	8.00E+02	Essential Nutrient		no data	no data	4.80E+02	B	J			
Selenium	4.80E-01	3.91E+01	NA	8.10E-01	- -	ND					
Sodium	6.34E+02	Essential Nutrient		no data	no data	3.27E+01	B	B			
Thallium	3.42E+00	5.08E-01	NA	1.00E+00	- -	ND					
Vanadium	5.88E+01	5.31E+01	NA	2.00E+00	- -	1.17E+01					YES
Zinc	4.06E+01	2.34E+03	NA	5.00E+01	- -	9.30E+00		J			
Semivolatile Organic Compounds											
Dibenzo(a,h)anthracene	NA	NA	8.61E-02	no data	1.84E+01	ND					
Fluoranthene	NA	3.09E+02	NA	1.00E-01	- -	ND					
Phenanthrene	NA	2.32E+03	NA	1.00E-01	- -	ND					
Pyrene	NA	2.33E+02	NA	1.00E-01	- -	ND					
Volatile Organic Compounds											
2-Butanone	NA	4.66E+03	NA	no data	8.96E+01	3.60E-03	J	B			
Acetone	NA	7.76E+02	NA	no data	2.50E+00	3.60E-02		B			
Bromomethane	NA	1.09E+01	NA	no data	no data	ND					
Methylene Chloride	NA	4.66E+02	8.41E+01	2.00E+00	- -	4.60E-03	JB	B			
p-Cymene	NA	1.55E+03	NA	no data	no data	ND					
Trichlorofluoromethane	NA	2.33E+03	NA	1.00E-01	- -	ND					

Table 5-1

Surface and Depositional Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

a Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), Final Background Metals Survey Report, Fort McClellan, Alabama, July. For SVOCs, value listed is the background screening criterion for soils adjacent to asphalt as given in IT Corporation 2000, Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.
b Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.
B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).
J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.
mg/kg - Milligrams per kilogram.
NA - Not available.
ND - Not detected.
Qual - Laboratory applied data qualifier.
Val Qual - Data validation applied qualifier.

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a]		Background[b] (total soil)	CDTF-126Q CDTF-126Q-GP01 BK0004 22-Jun-99 Start depth = 4 End depth = 8					CDTF-126Q CDTF-126Q-GP02 BK0006 21-Jun-99 Start depth = 8 End depth = 12				
	Noncancer SSSL (mg/kg)	Cancer SSSL (mg/kg)	(mg/kg)	mg/kg	Qual	ValQual	>background	>SSSL	mg/kg	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	7.80E+03	NA	1.36E+04	1.36E+04		J	YES	YES	2.20E+04		J	YES	YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	5.10E+00				YES	2.60E+00				YES
Barium	5.47E+02	NA	2.34E+02	5.19E+01					1.50E+02				
Beryllium	9.60E+00	NA	8.60E-01	5.80E-01		B			1.80E+00			YES	
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND					ND				
Calcium	Essential Nutrient		6.37E+02	8.12E+01	B	J			6.98E+01	B	J		
Chromium	2.32E-01	NA	3.83E+01	1.45E+01				YES	2.48E+01				YES
Cobalt	4.68E+02	NA	1.75E+01	3.70E+00	B	J			6.20E+00				
Copper	3.13E+02	NA	1.94E+01	8.40E+00		J			3.03E+01		J	YES	
Iron	2.34E+03	NA	4.48E+04	1.87E+04				YES	3.94E+04				YES
Lead	4.00E+02	NA	3.85E+01	1.51E+01		J			1.47E+01		J		
Magnesium	Essential Nutrient		7.66E+02	4.07E+02	B	J			1.44E+03		J	YES	
Manganese	3.63E+02	NA	1.36E+03	3.61E+02					2.59E+02				
Mercury	2.33E+00	NA	7.00E-02	2.80E-02	B	J			5.40E-02				
Nickel	1.54E+02	NA	1.29E+01	6.60E+00					1.73E+01			YES	
Potassium	Essential Nutrient		7.11E+02	5.23E+02	B	J			2.20E+03			YES	
Selenium	3.91E+01	NA	4.70E-01	5.00E-01	B	J	YES		6.40E-01			YES	
Sodium	Essential Nutrient		7.02E+02	6.50E+01	B	B			8.07E+01	B	B		
Thallium	5.08E-01	NA	1.40E+00	ND					ND				
Vanadium	5.31E+01	NA	6.49E+01	2.88E+01					3.12E+01				
Zinc	2.34E+03	NA	3.49E+01	1.77E+01		J			4.87E+01		J	YES	
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	ND					ND				
Volatile Organic Compounds													
Acetone	7.76E+02	NA	NA	ND					ND				
Bromomethane	1.09E+01	NA	NA	ND					ND				
Methylene Chloride	4.66E+02	8.41E+01	NA	4.10E-03	JB	B			3.90E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	ND					ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a] Noncancer SSSL (mg/kg)	Human Health Screening Values Resident[a] Cancer SSSL (mg/kg)	Background[b] (total soil) (mg/kg)	CDTF-126Q CDTF-126Q-GP03 BK0008 21-Jun-99 Start depth =8 End depth = 12 mg/kg	Qual	ValQual	>background	>SSSL	CDTF-126Q CDTF-126Q-GP04 BK0010 21-Jun-99 Start depth = 8 End depth = 12 mg/kg	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	7.80E+03	NA	1.36E+04	1.03E+04		J		YES	1.28E+04		J		YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	3.40E+01			YES	YES	5.60E+00				YES
Barium	5.47E+02	NA	2.34E+02	8.97E+01					3.04E+01				
Beryllium	9.60E+00	NA	8.60E-01	2.20E+00			YES		4.60E-01	B	B		
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND					ND				
Calcium	Essential Nutrient		6.37E+02	7.72E+01	B	J			6.83E+01	B	B		
Chromium	2.32E-01	NA	3.83E+01	3.30E+01				YES	1.73E+01				YES
Cobalt	4.68E+02	NA	1.75E+01	1.76E+01			YES		2.90E+00	B	J		
Copper	3.13E+02	NA	1.94E+01	3.37E+01		J	YES		5.90E+00		J		
Iron	2.34E+03	NA	4.48E+04	1.43E+05			YES	YES	1.88E+04				YES
Lead	4.00E+02	NA	3.85E+01	5.27E+01		J	YES		1.07E+01		J		
Magnesium	Essential Nutrient		7.66E+02	3.34E+02	B	J			2.69E+02	B	J		
Manganese	3.63E+02	NA	1.36E+03	1.18E+03				YES	3.93E+02				YES
Mercury	2.33E+00	NA	7.00E-02	5.50E-02					4.20E-02				
Nickel	1.54E+02	NA	1.29E+01	3.85E+01			YES		5.00E+00				
Potassium	Essential Nutrient		7.11E+02	3.43E+02	B	J			3.54E+02	B	J		
Selenium	3.91E+01	NA	4.70E-01	1.90E+00			YES		ND				
Sodium	Essential Nutrient		7.02E+02	8.62E+01	B	B			6.83E+01	B	B		
Thallium	5.08E-01	NA	1.40E+00	ND					ND				
Vanadium	5.31E+01	NA	6.49E+01	5.62E+01				YES	3.16E+01				
Zinc	2.34E+03	NA	3.49E+01	6.38E+01		J	YES		1.44E+01		J		
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	ND					ND				
Volatile Organic Compounds													
Acetone	7.76E+02	NA	NA	ND					ND				
Bromomethane	1.09E+01	NA	NA	1.40E-03	J	J			ND				
Methylene Chloride	4.66E+02	8.41E+01	NA	4.40E-03	JB	B			4.10E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	ND					ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a]		Background[b] (total soil)	CDTF-126Q CDTF-126Q-GP05 BK0012 22-Jun-99 Start depth = 8 End depth = 12					CDTF-126Q CDTF-126Q-GP06 BK0014 22-Jun-99 Start depth = 8 End depth = 12				
	Noncancer SSSL (mg/kg)	Cancer SSSL (mg/kg)	(mg/kg)	mg/kg	Qual	ValQual	>background	>SSSL	mg/kg	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	7.80E+03	NA	1.36E+04	1.23E+04		J		YES	3.07E+04		J	YES	YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	6.20E+00				YES	1.50E+01				YES
Barium	5.47E+02	NA	2.34E+02	2.91E+01					8.22E+01				
Beryllium	9.60E+00	NA	8.60E-01	5.60E-01	B	B			1.00E+00			YES	
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND					7.10E-01		J	YES	
Calcium	Essential Nutrient		6.37E+02	7.47E+01	B	J			2.69E+02	B	J		
Chromium	2.32E-01	NA	3.83E+01	1.67E+01				YES	6.03E+01			YES	YES
Cobalt	4.68E+02	NA	1.75E+01	4.30E+00	B	J			6.30E+00				
Copper	3.13E+02	NA	1.94E+01	9.10E+00		J			3.78E+01		J	YES	
Iron	2.34E+03	NA	4.48E+04	2.17E+04				YES	4.60E+04			YES	YES
Lead	4.00E+02	NA	3.85E+01	3.02E+01		J			1.32E+02		J	YES	
Magnesium	Essential Nutrient		7.66E+02	2.54E+02	B	J			5.47E+02	B	J		
Manganese	3.63E+02	NA	1.36E+03	4.39E+02				YES	8.88E+02				YES
Mercury	2.33E+00	NA	7.00E-02	3.10E-02	B	J			2.80E-02	B	J		
Nickel	1.54E+02	NA	1.29E+01	5.00E+00					1.31E+01			YES	
Potassium	Essential Nutrient		7.11E+02	3.20E+02	B	J			6.82E+02	B	J		
Selenium	3.91E+01	NA	4.70E-01	5.20E-01	B	J	YES		7.50E-01			YES	
Sodium	Essential Nutrient		7.02E+02	6.30E+01	B	B			1.39E+02	B	B		
Thallium	5.08E-01	NA	1.40E+00	ND					ND				
Vanadium	5.31E+01	NA	6.49E+01	3.22E+01					9.96E+01			YES	YES
Zinc	2.34E+03	NA	3.49E+01	1.59E+01		J			3.59E+01		J	YES	
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	ND					ND				
Volatile Organic Compounds													
Acetone	7.76E+02	NA	NA	9.40E-03	J	B			ND				
Bromomethane	1.09E+01	NA	NA	ND					ND				
Methylene Chloride	4.66E+02	8.41E+01	NA	3.90E-03	JB	B			4.60E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	ND					ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a]		Background[b] (total soil)	CDTF-126Q CDTF-126Q-GP07 BK0016 22-Jun-99 Start depth = 8 End depth = 12					CDTF-126Q CDTF-126Q-GP08 BK0018 22-Jun-99 Start depth = 8 End depth = 12				
	Noncancer SSSL (mg/kg)	Cancer SSSL (mg/kg)	(mg/kg)	mg/kg	Qual	ValQual	>background	>SSSL	mg/kg	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	7.80E+03	NA	1.36E+04	1.31E+04		J		YES	1.13E+04		J		YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	6.90E+00				YES	3.50E+00				YES
Barium	5.47E+02	NA	2.34E+02	3.59E+01					2.84E+01				
Beryllium	9.60E+00	NA	8.60E-01	1.20E+00			YES		3.40E-01	B	B		
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND					ND				
Calcium	Essential Nutrient		6.37E+02	1.56E+01	B	B			1.56E+01	B	B		
Chromium	2.32E-01	NA	3.83E+01	1.86E+01				YES	1.57E+01				YES
Cobalt	4.68E+02	NA	1.75E+01	3.66E+01			YES		2.60E+00	B	J		
Copper	3.13E+02	NA	1.94E+01	1.00E+01		J			6.10E+00		J		
Iron	2.34E+03	NA	4.48E+04	3.69E+04				YES	1.95E+04				YES
Lead	4.00E+02	NA	3.85E+01	9.00E+00		J			6.00E+00		J		
Magnesium	Essential Nutrient		7.66E+02	1.70E+03		J	YES		6.07E+02		J		
Manganese	3.63E+02	NA	1.36E+03	6.98E+02				YES	1.90E+01				
Mercury	2.33E+00	NA	7.00E-02	5.30E-02					3.20E-02	B	J		
Nickel	1.54E+02	NA	1.29E+01	8.10E+00					5.00E+00				
Potassium	Essential Nutrient		7.11E+02	2.86E+03			YES		8.14E+02			YES	
Selenium	3.91E+01	NA	4.70E-01	8.70E-01			YES		8.10E-01			YES	
Sodium	Essential Nutrient		7.02E+02	8.14E+01	B	B			7.24E+01	B	B		
Thallium	5.08E-01	NA	1.40E+00	ND					ND				
Vanadium	5.31E+01	NA	6.49E+01	3.60E+01					2.91E+01				
Zinc	2.34E+03	NA	3.49E+01	2.27E+01		J			1.82E+01		J		
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	ND					ND				
Volatile Organic Compounds													
Acetone	7.76E+02	NA	NA	1.60E-02	J	B			ND				
Bromomethane	1.09E+01	NA	NA	ND					ND				
Methylene Chloride	4.66E+02	8.41E+01	NA	4.60E-03	JB	B			5.00E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	3.80E-03	J	J			ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a]		Background[b] (total soil)	CDTF-126Q CDTF-126Q-GP09 BK0020 22-Jun-99 Start depth = 8 End depth = 12					CDTF-126Q CDTF-126Q-GP10 BK0022 23-Jun-99 Start depth = 8 End depth = 12				
	Noncancer SSSL (mg/kg)	Cancer SSSL (mg/kg)	(mg/kg)	mg/kg	Qual	ValQual	>background	>SSSL	mg/kg	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	7.80E+03	NA	1.36E+04	9.49E+03		J		YES	1.23E+04				YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	2.40E+00				YES	5.50E+00				YES
Barium	5.47E+02	NA	2.34E+02	5.18E+01					2.86E+01				
Beryllium	9.60E+00	NA	8.60E-01	5.40E-01	B	B			3.80E-01	B	B		
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND					ND				
Calcium	Essential Nutrient		6.37E+02	1.63E+02	B	J			2.13E+01	B	B		
Chromium	2.32E-01	NA	3.83E+01	1.33E+01				YES	2.43E+01				YES
Cobalt	4.68E+02	NA	1.75E+01	5.00E+00	B	J			2.80E+00	B	J		
Copper	3.13E+02	NA	1.94E+01	3.60E+00		J			7.50E+00				
Iron	2.34E+03	NA	4.48E+04	1.08E+04				YES	3.31E+04				YES
Lead	4.00E+02	NA	3.85E+01	7.20E+00		J			6.80E+00				
Magnesium	Essential Nutrient		7.66E+02	5.13E+02	B	J			9.33E+02			YES	
Manganese	3.63E+02	NA	1.36E+03	1.98E+02					5.89E+01				
Mercury	2.33E+00	NA	7.00E-02	4.30E-02					4.50E-02				
Nickel	1.54E+02	NA	1.29E+01	5.10E+00					5.80E+00				
Potassium	Essential Nutrient		7.11E+02	4.64E+02	B	J			1.34E+03			YES	
Selenium	3.91E+01	NA	4.70E-01	4.70E-01	B	J			1.60E+00			YES	
Sodium	Essential Nutrient		7.02E+02	5.68E+01	B	B			1.10E+02	B	B		
Thallium	5.08E-01	NA	1.40E+00	ND					9.40E-01	B	B		YES
Vanadium	5.31E+01	NA	6.49E+01	1.91E+01					3.94E+01				
Zinc	2.34E+03	NA	3.49E+01	1.90E+01		J			1.73E+01		J		
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	ND					ND				
Volatile Organic Compounds													
Acetone	7.76E+02	NA	NA	ND					6.60E-03	J	B		
Bromomethane	1.09E+01	NA	NA	ND					2.20E-03	J	J		
Methylene Chloride	4.66E+02	8.41E+01	NA	4.90E-03	JB	B			3.70E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	3.10E-03	J	J			ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a] Noncancer SSSL (mg/kg)	Human Health Screening Values Resident[a] Cancer SSSL (mg/kg)	Background[b] (total soil) (mg/kg)	CDTF-126Q CDTF-126Q-GP11 BK0026 23-Jun-99 Start depth = 8 End depth = 12 mg/kg	Qual	ValQual	>background	>SSSL	CDTF-126Q CDTF-126Q-GP16 BK0032 23-Jun-99 Start depth = 4 End depth = 7 mg/kg	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	7.80E+03	NA	1.36E+04	1.24E+04				YES	1.01E+04				YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	5.00E+00				YES	3.10E+00				YES
Barium	5.47E+02	NA	2.34E+02	3.09E+01					2.36E+01				
Beryllium	9.60E+00	NA	8.60E-01	4.30E-01	B	B			3.40E-01	B	B		
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND					ND				
Calcium	Essential Nutrient		6.37E+02	1.82E+01	B	B			4.31E+01	B	B		
Chromium	2.32E-01	NA	3.83E+01	2.64E+01				YES	1.34E+01				YES
Cobalt	4.68E+02	NA	1.75E+01	2.60E+00	B	J			2.00E+00	B	J		
Copper	3.13E+02	NA	1.94E+01	8.40E+00					4.30E+00				
Iron	2.34E+03	NA	4.48E+04	3.32E+04				YES	1.70E+04				YES
Lead	4.00E+02	NA	3.85E+01	6.70E+00					6.60E+00				
Magnesium	Essential Nutrient		7.66E+02	1.62E+03			YES		5.48E+02	B	J		
Manganese	3.63E+02	NA	1.36E+03	1.10E+01					2.42E+01				
Mercury	2.33E+00	NA	7.00E-02	4.00E-02	B	J			6.00E-02				
Nickel	1.54E+02	NA	1.29E+01	6.00E+00					4.80E+00				
Potassium	Essential Nutrient		7.11E+02	2.80E+03			YES		9.74E+02			YES	
Selenium	3.91E+01	NA	4.70E-01	1.70E+00			YES		9.00E-01			YES	
Sodium	Essential Nutrient		7.02E+02	1.18E+02	B	B			1.07E+02	B	B		
Thallium	5.08E-01	NA	1.40E+00	7.40E-01	B	B		YES	4.90E-01	B	B		
Vanadium	5.31E+01	NA	6.49E+01	4.25E+01					2.77E+01				
Zinc	2.34E+03	NA	3.49E+01	1.69E+01		J			1.55E+01		J		
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	8.50E-02	J	B			ND				
Volatile Organic Compounds													
Acetone	7.76E+02	NA	NA	1.40E-02	J	B			1.50E-02	J	B		
Bromomethane	1.09E+01	NA	NA	1.90E-03	J	J			ND				
Methylene Chloride	4.66E+02	8.41E+01	NA	5.80E-03	JB	B			4.40E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	ND					ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Human Health Screening Values Resident[a]		Background[b] (total soil)	CDTF-126Q CDTF-126Q-GP17 BK0034 23-Jun-99 Start depth = 4 End depth = 8				
	Noncancer SSSL (mg/kg)	Cancer SSSL (mg/kg)	(mg/kg)	mg/kg	Qual	ValQual	>background	>SSSL
Metals								
Aluminum	7.80E+03	NA	1.36E+04	1.00E+04				YES
Arsenic	2.34E+00	4.26E-01	1.83E+01	8.30E+00				YES
Barium	5.47E+02	NA	2.34E+02	3.49E+01				
Beryllium	9.60E+00	NA	8.60E-01	1.30E+00			YES	
Cadmium (solid media)	6.25E+00	NA	2.20E-01	ND				
Calcium	Essential Nutrient		6.37E+02	2.81E+01	B	B		
Chromium	2.32E-01	NA	3.83E+01	2.85E+01				YES
Cobalt	4.68E+02	NA	1.75E+01	8.30E+00				
Copper	3.13E+02	NA	1.94E+01	6.40E+00				
Iron	2.34E+03	NA	4.48E+04	4.46E+04				YES
Lead	4.00E+02	NA	3.85E+01	7.60E+00				
Magnesium	Essential Nutrient		7.66E+02	6.19E+02				
Manganese	3.63E+02	NA	1.36E+03	3.10E+02				
Mercury	2.33E+00	NA	7.00E-02	2.40E-02	B	J		
Nickel	1.54E+02	NA	1.29E+01	5.60E+00				
Potassium	Essential Nutrient		7.11E+02	1.14E+03			YES	
Selenium	3.91E+01	NA	4.70E-01	2.40E+00			YES	
Sodium	Essential Nutrient		7.02E+02	9.51E+01	B	B		
Thallium	5.08E-01	NA	1.40E+00	6.00E-01	B	B		YES
Vanadium	5.31E+01	NA	6.49E+01	4.78E+01				
Zinc	2.34E+03	NA	3.49E+01	1.15E+01		J		
Semivolatile Organic Compounds								
bis(2-ethylhexyl)phthalate	1.56E+02	4.52E+01	NA	ND				
Volatile Organic Compounds								
Acetone	7.76E+02	NA	NA	ND				
Bromomethane	1.09E+01	NA	NA	2.50E-03	J	J		
Methylene Chloride	4.66E+02	8.41E+01	NA	4.90E-03	JB	B		
Trichlorofluoromethane	2.33E+03	NA	NA	ND				

Table 5-2

Subsurface Soil Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

a Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.
b Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), Final Background Metals Survey Report, Fort McClellan, Alabama, July.
B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).
J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.
mg/kg - Milligrams per kilogram
NA - Not available
ND - Not detected
Qual - Laboratory applied data qualifier.
Val Qual - Data validation applied qualifier.

Table 5-3

Groundwater Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Resident[a] Noncancer SSSL (mg/L)	Resident[a] Cancer SSSL (mg/L)	Background[b] (mg/L)	CDTF-126Q CDTF-126Q-MW01 BK3001 (Non-filtered) 3-Aug-99 mg/L	Qual	ValQual	>background	>SSSL	CDTF-126Q CDTF-126Q-MW02 BK3004 (Non-filtered) 5-Aug-99 mg/L	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	1.56E+00	NA	2.34E+00	6.88E-02	B	B			4.52E+01			YES	YES
Arsenic	4.69E-04	4.46E-05	1.78E-02	ND					5.20E-03	B	J		YES
Barium	1.10E-01	NA	1.27E-01	9.07E-02	B	J			1.19E-01	B	J		YES
Beryllium	3.13E-03	NA	1.25E-03	ND					3.10E-03	B	B	YES	
Calcium	Essential Nutrient		5.65E+01	1.44E+01					1.90E+00	B	J		
Chromium (total)	4.69E-03	NA	NA	ND					6.50E-02				YES
Cobalt	9.39E-02	NA	2.34E-02	9.15E-02			YES		3.14E-02	B	J	YES	
Copper	6.26E-02	NA	2.55E-02	ND					5.26E-02		J	YES	
Iron	4.69E-01	NA	7.04E+00	6.86E-01				YES	4.35E+01			YES	YES
Lead	1.50E-02	NA	8.00E-03	ND					1.18E-02			YES	
Magnesium	Essential Nutrient		2.13E+01	3.88E+00	B	J			1.55E+01				
Manganese	7.35E-02	NA	5.81E-01	2.29E+00			YES	YES	4.50E-01				YES
Nickel	3.13E-02	NA	NA	1.95E-02	B	J			7.09E-02				YES
Potassium	Essential Nutrient		7.20E+00	6.13E+00					3.64E+01			YES	
Sodium	Essential Nutrient		1.48E+01	1.73E+00	B	J			2.60E+00	B	J		
Thallium	1.02E-04	NA	1.46E-03	8.70E-03	B	J	YES	YES	ND				
Vanadium	1.10E-02	NA	1.70E-02	ND					6.16E-02			YES	YES
Zinc	4.69E-01	NA	2.20E-01	1.54E-02	B	B			1.87E-01		J		
Volatile Organic Compounds													
Acetone	1.56E-01	NA	NA	2.00E-03	J	B			ND				
2-Butanone	7.14E-01	NA	NA	ND					ND				
Toluene	2.59E-01	NA	NA	ND					ND				
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	2.85E-02	4.31E-03	NA	1.10E-03	J B	B			ND				
Phenol	9.31E-01	NA	NA	1.20E-02		B			4.80E-03	J B	B		

Table 5-3

Groundwater Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Resident[a] Noncancer SSSL (mg/L)	Resident[a] Cancer SSSL (mg/L)	Background[b] (mg/L)	CDTF-126Q CDTF-126Q-MW03 BK3005 (Non-filtered) 5-Aug-99 mg/L	Qual	ValQual	>background	>SSSL	CDTF-126Q CDTF-126Q-MW04 BK3006 (Non-filtered) 5-Aug-99 mg/L	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	1.56E+00	NA	2.34E+00	1.47E+01			YES	YES	8.50E-02	B	B		
Arsenic	4.69E-04	4.46E-05	1.78E-02	4.00E-03	B	J		YES	ND				
Barium	1.10E-01	NA	1.27E-01	1.29E-01	B	J	YES	YES	1.44E-01	B	J	YES	YES
Beryllium	3.13E-03	NA	1.25E-03	1.20E-03	B	B			ND				
Calcium	Essential Nutrient		5.65E+01	1.75E+01					5.73E+01			YES	
Chromium (total)	4.69E-03	NA	NA	1.92E-02				YES	ND				
Cobalt	9.39E-02	NA	2.34E-02	5.21E-02			YES		1.90E-02	B	J		
Copper	6.26E-02	NA	2.55E-02	1.70E-02	B	B			ND				
Iron	4.69E-01	NA	7.04E+00	1.83E+01			YES	YES	2.03E-01				
Lead	1.50E-02	NA	8.00E-03	1.59E-02			YES	YES	ND				
Magnesium	Essential Nutrient		2.13E+01	6.57E+00					4.20E+00	B	J		
Manganese	7.35E-02	NA	5.81E-01	3.36E+00			YES	YES	3.88E+00			YES	YES
Nickel	3.13E-02	NA	NA	1.76E-02	B	J			1.77E-02	B	J		
Potassium	Essential Nutrient		7.20E+00	7.21E+00			YES		5.08E+00				
Sodium	Essential Nutrient		1.48E+01	2.01E+00	B	J			2.58E+00	B	J		
Thallium	1.02E-04	NA	1.46E-03	6.40E-03	B	J	YES	YES	5.80E-03	B	J	YES	YES
Vanadium	1.10E-02	NA	1.70E-02	2.75E-02	B	J	YES	YES	ND				
Zinc	4.69E-01	NA	2.20E-01	2.91E-02		B			1.40E-02	B	B		
Volatile Organic Compounds													
Acetone	1.56E-01	NA	NA	ND					6.90E-03	J	B		
2-Butanone	7.14E-01	NA	NA	ND					ND				
Toluene	2.59E-01	NA	NA	ND					1.20E-02		J		
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	2.85E-02	4.31E-03	NA	2.00E-03	J	B			3.20E-03	J	B		
Phenol	9.31E-01	NA	NA	8.60E-03	J B	B			1.20E-02	B	B		

Table 5-3

Groundwater Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Resident[a] Noncancer SSSL (mg/L)	Resident[a] Cancer SSSL (mg/L)	Background[b] (mg/L)	CDTF-126Q CDTF-126Q-MW05 BK3007 (Non-filtered) 5-Aug-99 mg/L	Qual	ValQual	>background	>SSSL	CDTF-126Q CDTF-126Q-MW06 BK3008 (Non-filtered) 3-Aug-99 mg/L	Qual	ValQual	>background	>SSSL
Metals													
Aluminum	1.56E+00	NA	2.34E+00	3.19E+00			YES	YES	4.94E-02	B	B		
Arsenic	4.69E-04	4.46E-05	1.78E-02	ND					ND				
Barium	1.10E-01	NA	1.27E-01	4.41E-02	B	J			9.17E-02	B	J		
Beryllium	3.13E-03	NA	1.25E-03	9.40E-04	B	B			ND				
Calcium	Essential Nutrient		5.65E+01	7.54E+00					1.51E+01				
Chromium (total)	4.69E-03	NA	NA	5.70E-03	B	J		YES	ND				
Cobalt	9.39E-02	NA	2.34E-02	7.10E-03	B	J			8.90E-03	B	J		
Copper	6.26E-02	NA	2.55E-02	ND					ND				
Iron	4.69E-01	NA	7.04E+00	3.53E+00				YES	6.00E-02	B	J		
Lead	1.50E-02	NA	8.00E-03	ND					ND				
Magnesium	Essential Nutrient		2.13E+01	3.14E+00	B	J			2.19E+00	B	J		
Manganese	7.35E-02	NA	5.81E-01	8.64E-01			YES	YES	6.75E-01			YES	YES
Nickel	3.13E-02	NA	NA	1.14E-02	B	J			ND				
Potassium	Essential Nutrient		7.20E+00	1.29E+01			YES		4.00E+00	B	J		
Sodium	Essential Nutrient		1.48E+01	1.03E+00	B	B			2.00E+00	B	J		
Thallium	1.02E-04	NA	1.46E-03	ND					ND				
Vanadium	1.10E-02	NA	1.70E-02	ND					ND				
Zinc	4.69E-01	NA	2.20E-01	2.36E-02		B							
Volatile Organic Compounds													
Acetone	1.56E-01	NA	NA	ND					1.80E-03	J	B		
2-Butanone	7.14E-01	NA	NA	ND					1.30E-03	J	B		
Toluene	2.59E-01	NA	NA	ND					ND				
Semivolatile Organic Compounds													
bis(2-ethylhexyl)phthalate	2.85E-02	4.31E-03	NA	ND					3.20E-03	J B	B		
Phenol	9.31E-01	NA	NA	4.70E-03	J B	B			3.80E-03	J	B		

Table 5-3

Groundwater Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

a Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.
b Bkg - Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), Final Background Metals Survey Report, Fort McClellan, Alabama, July.
B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).
J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.
mg/L - Milligrams per liter
NA - Not available
ND - Not detected
Qual - Laboratory applied data validation qualifier
Val Qual - Data validation applied qualifier.

Table 5-4

Surface Water Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/L)	Human Health Screening Values[b] Recreational Site User Noncancer SSSL (mg/L)	Human Health Screening Values[b] Recreational Site User Cancer SSSL (mg/L)	Ecological Screening Values[b] EPA Region IV Values (mg/L)	Ecological Screening Values[b] Supplemental Values (mg/L)	CDTF-126Q CDTF-126Q-SW/SD01 BK2001 24-Jun-99 mg/L	Qual	ValQual	>Background	>HHSSSL	>ECOSSSL
Metals											
Aluminum	5.26E+00	1.53E+01	NA	8.70E-02	--	1.17E-01	B	J			YES
Barium	7.54E-02	1.10E+00	NA	no data	3.90E-03	2.26E-02	B	J			
Calcium	2.52E+01	Essential Nutrient		no data	1.16E+02	6.29E+00					
Iron	1.96E+01	4.70E+00	NA	1.00E+00	--	2.67E-01					
Magnesium	1.10E+01	Essential Nutrient		no data	8.20E+01	3.20E+00	B	J			
Manganese	5.65E-01	6.40E-01	NA	no data	8.00E-02	7.67E-02					
Potassium	2.56E+00	Essential Nutrient		no data	5.30E+01	1.23E+00	B	J			
Sodium	3.44E+00	Essential Nutrient		no data	6.80E+02	1.12E+00	B	B			
Zinc	4.04E-02	4.65E+00	NA	5.89E-02	--	1.04E-02	B	J			
Volatile Organic Compounds											
Acetone	NA	1.57E+00	NA	no data	7.80E+01	2.00E-03	J	B			
Semivolatile Organic Compounds											
bis(2-Ethylhexyl)phthalate	NA	2.07E-01	5.17E-02	3.00E-04	--	5.60E-03	J B	B			YES
Phenol	NA	9.06E+00	NA	2.56E-01	--	7.60E-03	J B	B			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

a Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), Final Background Metals Survey Report, Fort McClellan, Alabama, July.

b Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/L - Milligrams per liter

NA - Not available

ND - Not detected

Qual - Laboratory applied data validation qualifier

Val Qual - Data validation applied qualifier.

Table 5-5

Sediment Analytical Results
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Chemical	Background[a] (mg/kg)	Human Health Screening Values Recreational Site User[b] Noncancer SSSL (mg/kg)	Human Health Screening Values Recreational Site User[b] Cancer SSSL (mg/kg)	Ecological Screening Values[b] EPA Region IV Values (mg/kg)	Ecological Screening Values[b] Supplemental Values (mg/kg)	CDTF-126Q CDTF-126Q-SW/SD01 BK1001 24-Jun-99 mg/kg	Qual	ValQual	>Background	>HHSSSL	>ECOSSSL
Metals											
Aluminum	8.59E+03	1.15E+06	NA	no data	no data	1.12E+04			YES		
Arsenic	1.13E+01	3.59E+02	5.58E+01	7.24E+00	--	2.00E+00					
Barium	9.89E+01	8.36E+04	NA	no data	no data	4.83E+01					
Beryllium	9.80E-01	1.50E+02	NA	no data	no data	5.90E-01	B	J			
Calcium	1.11E+03	Essential Nutrient		no data	no data	2.50E+02	B	J			
Chromium	3.11E+01	2.79E+03	NA	5.23E+01	--	1.80E+01					
Cobalt	1.10E+01	6.72E+04	NA	no data	5.00E+01	6.90E+00					
Copper	1.71E+01	4.74E+04	NA	1.87E+01	--	1.27E+01					
Iron	3.53E+04	3.59E+05	NA	no data	no data	2.27E+04					
Lead	3.78E+01	4.00E+02	NA	3.02E+01	--	1.26E+01					
Magnesium	9.06E+02	Essential Nutrient		no data	no data	1.88E+03			YES		
Manganese	7.12E+02	4.38E+04	NA	no data	no data	1.45E+02					
Mercury	1.20E-01	2.99E+02	NA	1.30E-01	--	1.80E-02	B	J			
Nickel	1.30E+01	1.76E+04	NA	1.59E+01	--	1.12E+01					
Potassium	1.01E+03	Essential Nutrient		no data	no data	2.82E+03			YES		
Selenium	7.20E-01	5.96E+03	NA	no data	no data	8.50E-01					
Sodium	6.92E+02	Essential Nutrient		no data	no data	1.09E+02	B	B			
Thallium	1.20E-01	7.78E+01	NA	no data	no data	5.30E-01	B	B			
Vanadium	4.09E+01	4.83E+03	NA	no data	no data	2.66E+01					
Zinc	5.27E+01	3.44E+05	NA	1.24E+02	--	2.69E+01		J			
Volatile Organic Compounds											
Methylene Chloride	NA	6.33E+04	9.84E+03	no data	1.26E+00	7.30E-03	B	B			
Trichlorofluoromethane	NA	3.06E+05	NA	no data	3.07E-03	6.80E-03	J	J			
Semivolatile Organic Compounds											
bis(2-ethylhexyl)phthalate	NA	2.17E+04	5.41E+03	1.82E-01	--	6.00E-02	J	B			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

a Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), Final Background Metals Survey Report, Fort McClellan, Alabama, July.
b Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July.
B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).
J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.
mg/kg - Milligrams per kilogram
NA - Not available
ND - Not detected
Qual - Laboratory applied data validation qualifier
Val Qual - Data validation applied qualifier.

Table 5-1, surface soil samples from CDTF-126Q-GP02 and CDTF-126Q-GP07 had lead concentrations exceeding background concentrations and ESVs and also had lead concentrations exceeding the highest background concentration (83 mg/kg). However, the lead results of both samples are within the same order of magnitude as the background samples collected by SAIC. There were not any other surface or depositional soil samples collected that contained lead at concentrations exceeding 83 mg/kg. Furthermore, 5 additional surface soil samples collected in the same general area did not contain lead above background concentrations or ESVs.

Historical data indicate that the CDTF is within several overlapping range fans. There are not any known operations in the vicinity of Buildings 4483 and 4484 that may be a source of lead in surface and depositional soil samples.

Only chromium and iron were detected in surface and depositional soils at levels exceeding both background concentrations and residential human health SSSLs and ESVs. The chromium concentration in the surface soil sample collected at CDTF-126Q-GP06 exceeded background concentrations and SSSLs. The iron concentrations in the surface soil samples collected at CDTF-126Q-GP06 and CDTF-126Q-GP16 exceeded background concentrations and SSSLs.

5.1.2 Volatile Organic Compounds

Acetone, 2-butanone, bromomethane, methylene chloride, p-cymene, and trichlorofluoromethane were detected in surface and depositional soil samples collected at the CDTF. At least one VOC was detected in each surface or depositional soil sample collected. Acetone, 2-butanone, and methylene chloride were detected in laboratory method blanks associated with the analyses. In addition, the analytical results of the other VOCs detected were flagged with a "J" data qualifier signifying that the result is greater than the method detection limit (MDL) but below the specified reporting limit. There were not any VOCs detected at concentrations exceeding residential human health or ESVs.

5.1.3 Semivolatile Organic Compounds

Four SVOCs were detected in surface and depositional soil samples collected at the CDTF. Fluoranthene, phenanthrene, and pyrene were detected in the surface soil sample from CDTF-126Q-GP01, and dibenzo(a,h)anthracene was detected in the surface soil sample from CDTF-126Q-GP10. The analytical results of the SVOCs detected in the surface and depositional soils were flagged with a "J" data qualifier signifying that the result is greater than the MDL but below

the specified reporting limit. There were not any SVOCs detected at concentrations exceeding residential human health or ESVs.

5.2 Subsurface Soil Sample Results

Thirteen subsurface soil samples were collected for chemical analyses at the CDTF Parcel 126Q-CWM. Subsurface soil samples were collected at depths greater than 1 foot bgs at various locations across the parcel. Analytical results were compared to background concentrations and residential human health SSSLs. There are not any ESVs developed for subsurface soils. Sample locations are shown on Figure 3-1. A summary of compounds detected in subsurface soils is presented in Table 5-2.

5.2.1 Metals

Fifteen metals including aluminum, arsenic, beryllium, cobalt, copper, magnesium, nickel, potassium, selenium, zinc, cadmium, chromium, iron, lead, and vanadium were detected in subsurface soils at concentrations exceeding background concentrations. Aluminum, arsenic, chromium, iron, and vanadium were detected in subsurface soils at levels exceeding both background concentrations and residential human health SSSLs. Only samples from CDTF-126Q-GP01, CDTF-126Q-GP02, CDTF-126Q-GP03, and CDTF-126Q-GP06 contained metals concentrations exceeding background concentrations and residential human health SSSLs.

IT compared the subsurface metals results from the baseline environmental investigation to the range of metals values of subsurface samples determined by SAIC (1998) (Appendix I). The comparison indicates that, with the exception of iron and selenium, all metals exceeding background concentrations are either within background ranges or within the same order of magnitude as the background ranges. The iron concentration in sample CDTF-126Q-GP03 and the selenium concentrations in four samples (CDTF-126Q-GP03, CDTF-126Q-GP10, CDTF-126Q-GP11, and CDTF-126Q-GP17) are within 1 order of magnitude of the background range. All other iron and selenium subsurface soil sample results are within the same order of magnitude as the respective background range.

5.2.2 Volatile Organic Compounds

Acetone, bromomethane, methylene chloride, and trichlorofluoromethane were detected in subsurface soil samples collected at the CDTF. Acetone and methylene chloride were detected in laboratory method blanks associated with the analyses. The remaining VOCs detected were

flagged with a "J" data qualifier signifying that the result is less than the MDL but greater than or equal to the specified reporting limit. There were not any VOCs detected at concentrations exceeding residential human health SSSLs.

5.2.3 Semivolatile Organic Compounds

The SVOC bis(2-ethylhexyl)phthalate was detected in the subsurface soil sample from CDTF-126Q-GP11. The analytical result was flagged with a "J" data qualifier signifying that result is greater than the method detection limit but below the specified reporting limit. In addition, bis(2-ethylhexyl)phthalate was detected in the laboratory method blank associated with the analysis. The bis(2-ethylhexyl)phthalate concentration did not exceed residential human health SSSLs.

5.3 Groundwater Sample Results

Six monitoring wells were sampled as part of the baseline environmental investigation. Sample locations are shown on Figure 3-1. Analytical results were compared to background concentrations and residential human health SSSLs. There are not any ESVs developed for groundwater. A summary of compounds detected in groundwater from wells installed at the CDTF is included in Table 5-3.

5.3.1 Metals

Twelve metals including aluminum, barium, beryllium, calcium, cobalt, copper, iron, lead, manganese, potassium, thallium, and vanadium were detected in unfiltered groundwater samples at concentrations exceeding background concentrations. Aluminum, barium, iron, lead, manganese, thallium, and vanadium exceeded background concentrations and residential human health SSSLs in unfiltered groundwater samples. The groundwater sample from CDTF-126Q-MW03 had the highest number of metals detected at concentrations exceeding both background concentrations and SSSLs while the groundwater sample from CDTF-126Q-MW06 only had manganese exceeding both background concentrations and SSSLs. As shown in the purge records on the sample collection logs included in Appendix A and summarized in Table 3-6, four of the six groundwater samples collected at the CDTF had high turbidity at the time of sample collection. The turbidity was the result of suspended particulates from the groundwater-saturated formation. Groundwater samples exhibiting the highest number of metals exceeding background and SSSLs (including CDTF-126Q-MW03) also had the highest turbidity readings at the time of sample collection. The groundwater sample collected at CDTF-126Q-MW06 had the lowest

turbidity reading. This correlation indicates that the suspended particulates contributed to the total concentration of metals detected in the groundwater samples.

Based on the results of a groundwater resampling effort conducted by IT to evaluate the effects of turbidity on metals concentrations in groundwater, high turbidity at the time of sample collection results in elevated metals concentrations (IT, 2000c). The resampling effort demonstrated that the concentrations of most metals in the lower turbidity samples were significantly lower (1 to 2 orders of magnitude) than in the higher turbidity samples.

IT compared the groundwater metals results from the baseline environmental investigation to the range of metals values of background groundwater samples determined by SAIC (1998) (Appendix I). Only aluminum, thallium, and vanadium in sample CDTF-126Q-MW03 exceeded background concentrations, human health SSSLs, and the highest respective background concentration. In addition, thallium in the groundwater sample from CDTF-126Q-MW04 exceeded background concentrations, human health SSSLs, and the highest background concentration. However, aluminum, thallium, and vanadium concentrations in groundwater collected from CDTF-126Q-MW03 and CDTF-126Q-MW04 are within the same order of magnitude as the background samples collected by SAIC.

5.3.2 Volatile Organic Compounds

Acetone, 2-butanone, and toluene were the only VOCs detected in groundwater at the CDTF. Acetone and 2-butanone were also detected in the laboratory method blank associated with the analyses. The analytical results of the VOCs detected were flagged with a "J" data qualifier signifying that the result is greater than the MDL but below the specified reporting limit. There were not any VOCs detected at concentrations exceeding residential human health SSSLs.

5.3.3 Semivolatile Organic Compounds

The SVOCs bis(2-ethylhexyl)phthalate and phenol were detected in groundwater samples collected at the CDTF. These compounds were detected in the laboratory method blanks associated with the analyses. In addition, the analytical results of the SVOCs detected were flagged with a "J" data qualifier signifying that the result is greater than the MDL but below the specified reporting limit. Neither SVOC was detected at a concentration exceeding residential human health SSSLs.

5.4 Surface Water Sample Results

One surface water sample was collected at the CDTF. Analytical results were compared to background concentrations, recreational site user human health SSSLs, and ESVs. There were not any residential human health SSSLs developed for surface water at FTMC. The sample location is shown on Figure 3-1. The surface water analytical results are summarized in Table 5-4.

5.4.1 Metals

Aluminum, barium, calcium, iron, magnesium, manganese, potassium, sodium, and zinc were detected in the unfiltered surface water sample collected at the CDTF. Aluminum exceeded the ESVs in the sample; however, the result did not exceed background concentrations. Aluminum was also detected in the associated method blank. None of the other metals was detected at a concentration exceeding recreational site user human health or ESVs.

5.4.2 Volatile Organic Compounds

Acetone was the only VOC detected in the surface water sample from the CDTF. The acetone analytical result was flagged with a "J" data qualifier signifying that the result is greater than the MDL but below the specified reporting limit. In addition, acetone was detected in the laboratory method blank associated with the analysis. The acetone concentration did not exceed recreational site user human health or ESVs.

5.4.3 Semivolatile Organic Compounds

The SVOCs bis(2-ethylhexyl)phthalate and phenol were detected in the surface water sample collected at the CDTF. The analytical results of the SVOCs detected were flagged with a "J" data qualifier signifying that the result is greater than the method detection limit but below the MDL. In addition, both compounds were detected in the laboratory method blank associated with the analyses. There were not any SVOCs detected at concentrations exceeding recreational site user human health SSSLs, however bis(2-ethylhexyl)phthalate exceeded the ESVs in the surface water sample.

5.5 Sediment Sample Results

One sediment sample was collected at the CDTF. Analytical results were compared to background concentrations, recreational site user human health SSSLs, and ESVs. There were

not any residential human health SSSLs developed for sediment at FTMC. The sample location is shown on Figure 3-1. The sediment analytical results are summarized in Table 5-5.

5.5.1 Metals

Aluminum, magnesium, and potassium were detected in the sediment sample from the CDTF exceeding background concentrations. However, the concentrations of these metals were within the range of background values determined by SAIC (1998). There were not any metals detected at concentrations exceeding recreational site user or ESVs.

5.5.2 Volatile Organic Compounds

Methylene chloride and trichlorofluoromethane were the only VOCs detected in the sediment sample from the CDTF. Methylene chloride was also detected in the laboratory blank. The trichlorofluoromethane analytical result was flagged with a "J" data qualifier signifying that the result is greater than the MDL but below or equal to the specified reporting limit. There were not any VOCs detected at concentrations exceeding recreational site user human health SSSLs, however trichlorofluoromethane detected in the sediment sample exceeded the ESVs. Trichlorofluoromethane (Freon-11) was formerly used as a propellant in fire extinguisher, and as a refrigerant, however, the source of trichlorofluoromethane at the CDTF is unknown. The methylene chloride concentration did not exceed recreational site user or ESVs.

5.5.3 Semivolatile Organic Compounds

The SVOC bis(2-ethylhexyl)phthalate was detected in the sediment sample collected at the CDTF. The bis(2-ethylhexyl)phthalate analytical result was flagged with a "J" data qualifier signifying that the result is greater than the MDL but below or equal to the specified reporting limit. In addition, bis(2-ethylhexyl)phthalate was detected in the associated laboratory method blank. The bis(2-ethylhexyl)phthalate concentration did not exceed recrea-tional site user or ESVs.

5.6 Air Monitoring Results

The results of air monitoring performed with MINICAMs August 16 through 18 at Building 4482 of the CDTF did not indicate the presence of CWM in any samples. Results of the air monitoring are included in Appendix H.

6.0 Summary and Conclusions and Recommendations

IT, under contract with USACE, completed a baseline environmental investigation at the CDTF, Parcel 126Q-CWM, at FTMC, Calhoun County, Alabama. The objectives of the investigation were to record the baseline environmental condition of the CDTF and to determine whether facility operations have impacted environmental media (i.e., soil, groundwater, and surface water). The CDTF was investigated in preparation for property transfer to the Department of Justice, Center for Domestic Preparedness.

The baseline environmental investigation at the CDTF consisted of the sampling and analyses of surface and subsurface soil samples, groundwater samples, and surface water and sediment samples. In addition, monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide geological and hydrogeological characterization information. Air monitoring for CWM was also performed in Building 4482 by the CDTF operating subcontractor. The CWM air monitoring results were used in conjunction with the information collected by IT to ascertain the baseline environmental condition of the site. The following sections summarize the geological/hydrogeological characterization information obtained by IT and the analytical results of environmental samples collected at the CDTF. Finally, recommendations are provided based on the geological/hydrogeological characterization and analytical results.

6.1 Geology and Hydrogeology

The geology and hydrogeology of the CDTF were characterized using data collected from 13 soil borings and 6 monitoring wells installed at the site. The CDTF, Parcel 126Q-CWM, is underlain by silt and clay grading to purple shale and siltstone. Borings installed to the northwest of the CDTF indicate that the residuum consists of clayey to silty sand underlain by hard chert and massive clayey silt. Based on hollow-stem auger refusal, hard, competent bedrock was encountered at depths ranging from 23 to 65 feet bgs. Bedrock in the vicinity of the CDTF has been assigned by others to the Cambrian Shady Dolomite. Surface water flows generally to west-northwest and eventually discharges into Cave Creek.

During boring and well installation activities, groundwater was generally encountered in the shallow groundwater-bearing zone within weathered shale/siltstone. Groundwater flow at the site is to the northwest with a hydraulic gradient of approximately 0.03 ft/ft. Based on water

elevations from wells installed at the CDTF, static groundwater levels in the vicinity of the site range from about 8 to 35 feet bgs and appears to be under a downward vertical hydraulic head.

6.2 Summary of Analytical Results

IT collected 17 surface soil samples, 13 subsurface soil samples, 2 depositional soil samples, 6 groundwater samples, and 1 surface water sample, and 1 sediment sample during the baseline environmental investigation at the CDTF. The analytical results indicate that metals, VOCs, and SVOCs were detected in each of the environmental media sampled. Organophosphorus pesticides were not detected in any site media. Analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing site investigations being performed under the BRAC environmental restoration program at FTMC. Additionally, metals concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998), and SVOC concentrations exceeding SSSLs and ESVs in surface and depositional soils were compared to PAH background screening values, where available (IT, 2000c). A comparison of the analytical results to background concentrations, SSSLs, and ESVs was performed and summarized as follows:

- Chromium and iron in surface and depositional soils exceed background concentrations, residential human health SSSLs, and ESVs. However, there does not appear to be a well-defined spatial distribution. Lead exceeded background and ESVs at several locations; however, the lead concentrations in surface samples from the CDTF are within the same order of magnitude as background sample results determined by SAIC.

- Aluminum, arsenic, chromium, iron, and vanadium concentrations in subsurface soil exceed background concentrations and residential human health SSSLs; three subsurface soil samples collected at the northwest corner of the parcel had metals concentrations exceeding background concentrations and residential human health SSSLs. With the exception of iron and selenium, the metals concentrations in subsurface soil samples are within the same order of magnitude as background sample results. Iron and selenium concentrations are within 1 order of magnitude of background sample results determined by SAIC.

- Aluminum, barium, iron, lead, manganese, thallium, and vanadium concentrations in groundwater exceed background concentrations and residential human health SSSLs; however, there is a correlation between groundwater samples with high turbidity and the occurrence of metals exceeding background concentrations and SSSLs. Aluminum, thallium, and vanadium concentrations exceeded background

and human health SSSLs at several locations, however the concentrations in groundwater samples from the CDTF are within the same order of magnitude as background sample results determined by SAIC.

- The SVOC bis(2-ethylhexyl)phthalate was detected in the surface water sample at a concentration exceeding the ESVs, however bis(2-ethylhexyl)phthalate was also detected in the method blank associated with the analyses.

- The VOC trichlorofluoromethane was detected in the sediment sample at a concentration exceeding the ESVs.

There were not any metals detected in either surface water or sediment that exceeded background concentrations and recreational site user human health SSSLs or ESVs.

The results of air monitoring performed in Building 4482 by the CDTF operating contractor indicate that CWM is not present in the building.

6.3 Conclusions and Recommendations

Based on the results of the baseline environmental investigation, activities performed at CDTF do not appear to have adversely impacted the environment. Compounds detected in site media exceeding residential and recreational site user human health SSSLs and ESVs are limited to metals in surface, subsurface, and depositional soils and groundwater. The SVOC bis(2-ethylhexyl)phthalate was detected in the surface water sample at a concentration above the ESVs. However, bis(2-ethylhexyl)phthalate is a known laboratory artifact and was detected in the associated method blank, which indicates that its presence was due to either field sampling or laboratory bias. The SVOC bis(2-ethylhexyl)phthalate was not used in any known processes at the CDTF. Trichlorofluoromethane was detected in the sediment sample at a concentration exceeding ESVs. Trichlorofluoromethane was not used in any known processes at the CDTF, but was formerly commonly used as a propellant for fire extinguishers and as a refrigerant.

With the exception of lead in some of surface and depositional soil samples, there does not appear to be a well-defined spatial distribution of metals detected above background values and ESVs in any site media. Six of eleven surface soil samples collected in the vicinity of Buildings 4483 (Incinerator) and 4484 (Waste Treatment and O&M) contained lead above background and ESVs. However, lead results from the samples collected during the baseline environmental investigation contained lead concentrations within the same order of magnitude as the background samples collected. The source of lead at concentrations exceeding background

concentrations and ESVs is not known. The area encompassing the surface sample locations with lead concentrations exceeding background and ESVs is fenced and consists of buildings and lawn interrupted with concrete pavement. Based on this, viable ecological habitat within the area is reasonably expected to be minimal and thus the lead concentrations detected do not pose an ecological threat.

Only one groundwater sample at the CDTF contained a large association of metals at concentrations exceeding background levels and SSSLs; however, this sample was extremely turbid (greater than 1000 nephelometric turbidity units) and the analytical result reflects the presence of metals associated with the high turbidity. It should be noted, however, that high turbidity (>100 nephelometric turbidity units) was encountered in four of the six samples at the time of collection which can result in elevated metals concentrations (IT, 2000c). However, the overall impact to groundwater at the CDTF is negligible and the potential threat to human health is expected to be very low.

Based on sample results from the baseline environmental investigation, metals concentrations in site media do not appear to related to CDTF operations.

IT recommends “No Further Action” in terms of additional investigations or remedial actions by the U.S. Army at the CDTF, Parcels 126Q-CWM, 62(2), 59(7), and 104(7). However, due to the fact that this property was used for chemical warfare training purposes, the U.S. Army should consider placing restrictions on future site activities and land use that may result in human exposures to these substances.

7.0 References

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APPENDIX A

SAMPLE COLLECTION LOGS

APPENDIX B

BORING LOGS AND WELL LOGS

APPENDIX C

WELL DEVELOPMENT LOGS

APPENDIX D

SURVEY DATA

Appendix D

Survey Data
Chemical Defense Training Facility, Parcel 126Q-CWM
Fort McClellan, Calhoun County, Alabama

Sample Location	Northing	Easting	Ground Elevation (ft msl)	Top of Casing Elevation (ft msl)
CDTF-126Q-DEP01	1175655.29	676328.87	900.67	NA
CDTF-126Q-DEP02	1175545.60	676333.59	901.18	NA
CDTF-126Q-GP01	1175819.60	676762.62	907.23	NA
CDTF-126Q-GP02	1175875.80	676678.15	907.18	NA
CDTF-126Q-GP03	1175819.46	676631.11	911.78	NA
CDTF-126Q-GP04	1175877.67	676613.33	906.81	NA
CDTF-126Q-GP05	1175938.15	676577.91	909.28	NA
CDTF-126Q-GP06	1175940.19	676491.04	907.47	NA
CDTF-126Q-GP07	1175798.10	676549.38	910.84	NA
CDTF-126Q-GP08	1175807.64	676507.06	909.76	NA
CDTF-126Q-GP09	1175868.54	676489.34	907.60	NA
CDTF-126Q-GP10	1175805.92	676472.27	909.12	NA
CDTF-126Q-GP11(DS)	1175775.78	676485.57	909.80	NA
CDTF-126Q-GP11(SS)	1175785.78	676486.89	908.78	NA
CDTF-126Q-GP12	1175565.33	677372.17	930.41	NA
CDTF-126Q-GP13	1176353.40	676515.26	901.63	NA
CDTF-126Q-GP14	1175435.29	675978.63	889.71	NA
CDTF-126Q-GP15	1174660.60	676605.32	919.46	NA
CDTF-126Q-GP16	1175662.95	676699.45	915.31	NA
CDTF-126Q-GP17	1175648.60	676716.56	915.19	NA
CDTF-126Q-MW01	1175741.27	676633.66	912.02	911.84
CDTF-126Q-MW02	1175645.39	676475.22	915.77	915.58
CDTF-126Q-MW03	1176018.98	676455.43	893.34	896.31
CDTF-126Q-MW04	1175908.01	676285.15	901.11	904.33
CDTF-126Q-MW05	1175261.60	677091.35	927.00	929.55
CDTF-126Q-MW06	1175659.02	676474.16	915.92	915.53
CDTF-126Q-SW/SD01	1176044.22	676665.34	901.09	NA

Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum (NAD83), 1983.

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

ft msl - Feet mean sea level.
NA - Not available, well not installed.

APPENDIX E

SUMMARY OF VALIDATED ANALYTICAL DATA

APPENDIX F

DATA VALIDATION SUMMARY REPORT

Appendix F

Data Validation Summary Report for the Site Investigation Performed at the Chemical Defense Training Facility (Parcel CDTF-126Q) Fort McClellan, Calhoun County, Alabama

F1.0 Introduction

Level III data validation was performed on 100% of the environmental samples collected at Parcel CDFT-126Q. The analytical data consisted of four sample delivery groups (SDG), PK126Q01 through PK126Q04, which were analyzed by Quanterra Incorporated. Both soil and water matrices were validated. It should be noted that an evaluation of the field split data was not performed during data validation, since it was not available from the USACE-SAD laboratory. The chemical parameters for which the samples were analyzed, are identified below:

Parameter (Method)
TCL Volatile Organics by GC/MS SW-846 8260B
TCL Semivolatiles by GC SW-846 8270C
Metals by SW-846 6010B and 7471A/7470A
Organophosphorous Pesticides by SW-846 8141A

F2.0 Procedures

The sample data were validated following the logic identified in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines For Inorganic Data Review (February 1994)* and *USEPA Contract Laboratory Program National Functional Guidelines For Organic Review (February 1994)* for all areas except Blanks. *Region III Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (April 1993)* and *Region III National Functional Guidelines for Organic Data Review (June 1992)* were applied to the areas associated with blank contamination. Specific quality control (QC) criteria, as identified in the Quality Assurance Plan (QAP), analytical methods, and laboratory Standard Operating Procedures (SOP) were applied to all sample results. As the result of the use of Update III SW846 test methods for the analytical

data and the application of the CLP guidelines during the validation process, there were instances where specific QC requirements for all target compounds were not defined. This primarily occurred in the organic, Gas Chromatograph (GC) and Gas Chromatograph/Mass Spectra (GC/MS) calibration areas and is due to the fact that the analytical methods are "performance-based," and allows the use of average calibration responses, in lieu of, individual responses, which are defined by CLP protocol. In light of applying CLP guidelines to SW846 methods and evaluating the usability of the data during the validation process, specific QC criteria were determined to address all target compounds and are identified in this report for each parameter, as well as, in the validation checklists, which function as worksheets. All completed validation checklists are on file in the Knoxville office. For those analytical methods not addressed by the CLP and Region III guidelines, the validation was based on the method requirements (i. e. SW846, CFR, SOPs, QAP) and technical judgement following the logic of the CLP validation guidelines.

F3.0 Summary of Data Validation Findings

The overall quality of the data was determined to be acceptable. The only rejected data (>R= qualified) was due to "poor performing" volatile compounds (ketones, some halogenated hydrocarbons, e.g.), which exhibited poor calibration responses in the associated calibration data, and samples that were reanalyzed and have more than one result reported.

Individual validation reports have been prepared for each parameter in each SDG and the overall results of the validation findings are summarized in this report. The validation qualifier data entry verification report (Attachment A) is also provided. This is a complete listing of all of the analytical results and the validation qualifiers assigned for CDTF-126Q sites. It also identifies the "use" column, which indicates which result to use in the event of a reanalysis. A listing of the validation qualifiers and the reason codes, along with their definitions is also found in Attachment A. The following section highlights the key findings of the data validation for each analysis.

F4.0 Analysis-Specific Data Validation Summaries

F4.1 Volatile Organics by GC/MS SW846-8260B

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times. Technical holding time criteria were met for all samples.

Sample Preservation. All samples were properly preserved with the exception of sample BK3006, from SDG PK126Q04. The sample vial for BK3006 was received by the laboratory with headspace. Non-detect results were estimated (qualified >UJ=); Positive results were estimated (qualified >J=); Unless >B= qualified due to blank contamination.

Initial and Continuing Calibration. All initial and continuing calibrations associated with the project samples met QC criteria, with the exceptions of the following:

X The following demonstrated RRFs below 0.1 in the ICAL and/or CCAL: Non-detect results were rejected (qualified >R=); Positive results were estimated (qualified >J=); Unless >B= qualified due to blank contamination:

SDG	Samples Affected	Analyte / Analytes	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Acetone, 2-Butanone, Bromomethane, 1,2-Dibromo-3-Chloropropane	*B/**R/J
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Acetone, 2-Butanone, 1,2-Dibromo-3-Chloropropane	*B/**R/J
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0031, BK0032, BK0033, BK0034	Bromomethane	*B/**R/J
PK126Q03	BK2001	Acetone, 2-Butanone, Dibromomethane, Bromochloromethane, 1,2-Dibromo-3-Chloropropane	*B/**R
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007, BK3008	Acetone, 2-Butanone, Dibromomethane, Bromochloromethane, 1,2-Dibromo-3-Chloropropane	*B/**R

*>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.
**>R= qualifiers take precedence over estimating qualifiers.

X The following exhibited individual ICAL %RSD>30 and/or CCAL %D>20: Non-detect results were estimated (qualified >UJ=); Unless rejected (qualified >R=) due to ICAL/CCAL minimum RRF criteria not met; Positive results were estimated (qualified >J=); Unless >B= qualified due to blank contamination:

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Bromomethane, Acetone, n-Butylbenzene, 1,2-Dibromo-3-Chloropropane, Methylene Chloride, Chloroethane, 2-Butanone, 2-Hexanone	*B/**R/UJ/J
PK126Q01	BK0001, BK0002, BK0004, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0011, BK0012, BK0013, BK0014	p-Isopropyltoluene, Bromoform, 1,2,4-Trichlorobenzene	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0031, BK0032, BK0033, BK0034	Acetone, n-Butylbenzene, 1,2-Dibromo-3-Chloropropane, Chloroethane, 2-Butanone, 2-Hexanone	*B/**R/UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Bromomethane, Methylene Chloride	*B/**R/UJ/J
PK126Q03	BK2001	Naphthalene, Methylene Chloride, 1,2,3-Trichlorobenzene, 1,2,4-Trichlorobenzene	UJ
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007, BK3008	Methylene Chloride	UJ

*>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.
**>R= qualifiers take precedence over estimating qualifiers.

Blanks. The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable

with the exception of the following:

X Note: >B= Qualifiers were applied to all of the following sample results.

SDG	Samples Affected	Analyte/Analytes	Associated Blank Contamination
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Methylene Chloride	Method
PK126Q01	BK0012, BK0015, BK0016, BK0017	Acetone	ER
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Methylene Chloride	Method
PK126Q02	BK0022, BK0024, BK0026, BK0029, BK0032, BK0033, BK0035, BK0036, BK0037	Acetone	ER
PK126Q02	BK0027, BK0028, BK0030, BK0033, BK0036	2-Butanone	ER
PK126Q03	BK2001	Acetone	TB
PK126Q04	BK3001, BK3002, BK3006, BK3008	Acetone	ER/TB
PK126Q04	BK3008	2-Butanone	ER/TB

>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.

Surrogate Recoveries. All surrogate recoveries are within acceptable QC limits.

Matrix Spike/Matrix Spike Duplicate. MS/MSD and Laboratory Control Sample (LCS) were performed for the project samples and all QC criteria were met.

Field Duplicates. Original and field duplicate results were evaluated and no problems were noted, with the exception of the following:

X Note: Soil-50% criteria applied. Water-35% criteria applied.

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier

PK126Q04	BK3001(original), BK3002 (duplicate)	Acetone	*B

*>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.

Internal Standards. All internal standards met criteria with the exception of the following:

X All compounds associated with the internal standards listed in the table below were qualified as indicated.

SDG	Samples Affected	Internal Standard Outsid QC Limits	Validation Qualifier
PK126Q01	BK0015	1,4-Dichlorobenzene-d4	**R/UJ
PK126Q02	BK0027, BK0028, BK0030, BK0036	1,4-Dichlorobenzene-d4	**R/UJ/J

Quantitation. Results quantified between the MDL and the RL, which the lab qualified as AJ,≅ were qualified as estimated >J= unless blank contamination was present or the results were rejected.

F4.2 TCL Semivolatiles by GC/MS SW-846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times. Technical holding time criteria were met for all samples.

Initial and Continuing Calibration. All initial and continuing calibrations associated with the project samples met QC criteria with the exceptions of the following:

X The following exhibited individual ICAL %RSD>30 and/or CCAL %D>20:

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	2,4-Dinitrophenol, 4,6-Dinitro-2-Methylphenol	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036,	2,4-Dinitrophenol	UJ

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier
	BK0037, BK1001		
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK1001	4,6-Dinitro-2-Methylphenol	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0031, BK0032, BK0033, BK0034	2-Methylphenol	UJ
PK126Q02	BK0028, BK0029, BK0030, BK0035, BK0036, BK1001	4-Nitrophenol	UJ
PK126Q02	BK0031, BK0033,	4-Methylphenol	UJ
PK126Q03	BK2001	2,4-Dinitrophenol, 4,6-Dinitro-2-Methylphenol	UJ
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007, BK3008	2,4-Dinitrophenol, 4,6-Dinitro-2-Methylphenol	UJ
PK126Q04	BK3004, BK3005, BK3006, BK3007	Bis(2-chloroethyl)ether	UJ

Blanks. The 5X/10X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found to be acceptable with the exception of the following:

X Note: >B= Qualifiers were applied to all of the following sample results.

SDG	Samples Affected	Analyte/Analytes	Associated Blank Contamination
PK126Q02	BK0026, BK1001	Bis(2-ethylhexyl)phthalate	ER
PK126Q03	BK2001	Bis(2-ethylhexyl)phthalate, Phenol	Method
PK126Q04	BK3001, BK3005, BK3006, BK3008	Bis(2-ethylhexyl)phthalate	Method/ER
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007, BK3008	Phenol	Method/ER

>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.

Surrogate Recoveries. All surrogate recoveries are within acceptable QC limits.

Matrix Spike/Matrix Spike Duplicate. Batch QC was performed for the project samples and all QC criteria were met.

Laboratory Control Sample (LCS). All QC criteria were met for the LCS associated with the project sample analyses with the exception of the following:

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier
PK126Q04	BK3001, BK3002, BK3008	4-Nitrophenol, Pentachlorophenol	UJ

Field Duplicates. Original and field duplicate results were evaluated and no problems were noted.

Internal Standards. All internal standards met criteria.

Quantitation. Results quantified between the MDL and the RL, which the lab qualified as AJ,≅ were qualified as estimated >J= unless blank contamination was present or the results were rejected.

F4.3 Metals by SW-846 6010B/7471A/7470A

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times. Technical holding time criteria were met for all samples.

Initial and Continuing Calibrations. All initial and continuing calibrations associated with the project samples met QC criteria with the exception of the following for exceeding the CCV QC limit for Cadmium:

SDG	Samples Affected	Element/Elements	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Cadmium	J/UJ

Blanks. The 5X rule for contaminants found in the associated equipment rinse, calibration, and method blanks was applied to all sample results. All were acceptable with the exceptions noted below:

X Note: >B= Qualifiers were applied to all of the following sample results.

SDG	Samples Affected	Element/Elements	Associated Blank Contamination
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Sodium	Method/Calibration/ER
PK126Q01	BK0001, BK0002, BK0004, BK0007, BK0009, BK0010, BK0011, BK0012, BK0015, BK0017, BK0018, BK0019, BK0020	Beryllium	Calibration
PK126Q01	BK0002, BK0005, BK0011, BK0015, BK0017	Thallium	Calibration/ER
PK126Q01	BK0010, BK0016, BK0018	Calcium	ER
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Sodium	Method/Calibration/ER
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0032, BK0033, BK0035	Beryllium	Calibration
PK126Q02	BK0021, BK0022, BK0023, BK0026, BK0028, BK0029, BK0031, BK0032, BK0034, BK0036, BK1001	Thallium	Calibration/ER
PK126Q02	BK0022, BK0026, BK0032, BK0034	Calcium	ER
PK126Q03	BK2001	Sodium	Method/Calibration
PK126Q04	BK3002, BK3007	Sodium	ER
PK126Q04	BK3001, BK3002, BK3005, BK3006, BK3007	Zinc	Method
PK126Q04	BK3001, BK3002, BK3006, BK3008	Aluminum	ER
PK126Q04	BK3004, BK3005, BK3007	Beryllium	Calibration
PK126Q04	BK3005	Copper	Calibration

>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.

Matrix Spike/Matrix Spike Duplicate. Batch QC was performed for the project samples and all QC criteria were met, with the following exceptions:

SDG	Samples Affected	Element/Elements	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Antimony, Lead, Copper, Calcium, Zinc	*B/UJ/J
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Antimony, Calcium, Zinc	*B/UJ/J

*>B= qualifiers assigned to designate blank contamination, which are identification qualifiers, take precedence over estimating qualifiers, assigned due to quantitation.

Laboratory Control Sample (LCS). All QC criteria were met for the LCS associated with the project sample analyses.

Interference Check Sample (ICS) . All ICS % recoveries, where applicable, were acceptable.

ICP Serial Dilutions. All QC criteria were met with the exception of the following:

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Magnesium, Aluminum	J
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007,	Zinc	J
PK126Q04	BK3004, BK3005	Copper	J

Field Duplicates. Original and field duplicate results were evaluated and no problems were noted, with the exception of the following:

X Note: Soil-50% criteria applied. Water-35% criteria applied.

SDG	Samples Affected	Element/Elements	Validation Qualifier
PK126Q01	BK0001(original), BK0002 (duplicate)	Mercury	J
PK126Q02	BK0035(original), BK0036 (duplicate)	Lead	J
PK126Q04	BK3001(original), BK3002 (duplicate)	Thallium	J

Sample Quantitation. Results quantified between the IDL and the RL (AB≅ flagged by the laboratory) were qualified as estimated (J).

F4.4 Organophosphorous Pesticides by SW-846 8141A

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times. Technical holding time criteria were met for all project samples.

Initial and Continuing Calibration. All initial and continuing calibrations associated with the project samples met QC criteria, with the exceptions of the following:

X The following exhibited individual ICAL %RSD>20 : Non-detect results were estimated (qualified >UJ=); Positive results were estimated (qualified >J=); Unless >B= qualified due to blank contamination:

SDG	Samples Affected	Analyte	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Naled	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Naled	UJ
PK126Q03	BK2001	Naled	UJ
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007, BK3008	Naled	UJ

X The following exhibited individual primary CCAL %D>15% and/or confirmation %D>25%: Non-detect results were estimated (qualified >UJ=); Positive results were estimated (qualified >J=); Unless >B= qualified due to blank contamination:

SDG	Samples Affected	Analyte/Analytes	Validation Qualifier
PK126Q01	BK0001, BK0002, BK0004, BK0005, BK0006, BK0007, BK0008, BK0009, BK0010, BK0011, BK0012, BK0013, BK0014, BK0015, BK0016, BK0017, BK0018, BK0019, BK0020	Naled, Dichlorvos, Dimethoate	UJ
PK126Q01	BK0001, BK0002, BK0004, BK0011, BK0012, BK0013, BK0014,	Demeton (Total), Famphur, Malathion, Sulfotepp	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0031, BK0032, BK0033, BK0034, BK0035, BK0036, BK0037, BK1001	Naled	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0027, BK0028, BK0029, BK0030, BK0035, BK0036, BK0037, BK1001	Dichlorvos, Dimethoate	UJ
PK126Q02	BK0021, BK0022, BK0023, BK0024, BK0026, BK0035, BK0036, BK0037, BK1001	Demeton (Total), Famphur, Malathion, Sulfotepp	UJ
PK126Q03	BK2001	Naled, Dichlorvos, Dimethoate, Demeton (Total), Famphur, Malathion, Sulfotepp	UJ
PK126Q04	BK3001, BK3002, BK3004, BK3005, BK3006, BK3007, BK3008	Merphos, Dimethoate, Azinphos-Methyl, Mevinphos	UJ

Blanks. The 5X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries. All surrogate recoveries are within acceptable QC ranges for the surrogates applied.

Matrix Spike/Matrix Spike Duplicate. MS/MSD and Laboratory Control Sample (LCS) were performed for the project samples and all QC criteria were met.

Field Duplicates. Original and field duplicate results were evaluated and no problems were identified.

Quantitation. Results quantified between the MDL and the RL, which the lab qualified as AJ,≅ were qualified as estimated >J= unless blank contamination was present or the results were rejected.

ATTACHMENT A

DATA VALIDATION QUALIFIER ENTRY VERIFICATION REPORT

APPENDIX G

VARIANCES/NONCONFORMANCES

APPENDIX H

RESULTS OF AIR MONITORING IN BUILDING 4482

APPENDIX I

SUMMARY STATISTICS FOR BACKGROUND MEDIA FORT MCCLELLAN, ALABAMA

ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

AC	hydrogen cyanide
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ADEM	Alabama Department of Environmental Management
AL	Alabama
amb.	amber
APT	armor piercing tracer
ASP	Ammunition Supply Point
ASR	Archives Search Report, July 1999
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
B	analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCT	BRAC Cleanup Team
BDO	battle dress overgarment
BFB	bromofluorobenzene
bgs	below ground surface
bkg	background
bls	below land surface
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTOC	below top of casing
BZ	breathing zone
CAM	chemical agent monitor
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CDTF	Chemical Defense Training Facility
CDZ	contamination reduction zone
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CG	cyanogen chloride
ch	inorganic clays of high plasticity
CK	carbonyl chloride
cl	inorganic clays of low to medium plasticity
Cl.	chlorinated
CLP	Contract Laboratory Program
CN	chloroacetophenone
COC	chain of custody
CRL	certified reporting limit
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear wide mouth
CX	dichloroformoxime
°F	degrees Fahrenheit
D	duplicate
DANC	decontamination agent, non-corrosive
DDT	dichlorodiphenyltrichloroethane
DEP	depositional
DI	deionized
DIMP	di-isopropylmethylphosphonate
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DP	direct-push
DQO	data quality objective
DS2	Decontamination Solution Number 2
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
EG&G	EG&G Technical Services, Inc.
Elev.	elevation
EM	electromagnetic
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive and ordnance disposal
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
ER	equipment rinsate
ESE	Environmental Science and Engineering, Inc.
ESV	ecological screening value
E-W	east to west
EZ	exclusion zone
FB	field blank
FD	field duplicate
FedEx	Federal Express, Inc.
FFE	field flame expedient
Fil	filtered
Flt	filtered
FMP 1300	Former Motor Pool 1300 Site
Frtn	fraction
FS	field split
ft	feet
ft/ft	feet per foot
FTA	fire training area
FTMC	Fort McClellan
g	gram
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GFAA	graphite furnace atomic absorption
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GSSI	Geophysical Survey Systems, Inc.
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
HNO_3	nitric acid
hr	hour
HTH	calcium hypochlorite
HTRW	hazardous, toxic, and radioactive waste
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDW	investigation-derived waste
IMPA	isopropylmethyl phosphonic acid
in.	inch
IT	IT Corporation
ITEMS	IT Environmental Management System ™
J	estimated concentration
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
K	conductivity
L	lewisite; liter
l	liter
LCS	laboratory control sample
LEL	lower explosive limit
LT	less than the certified reporting limit
max	maximum
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µCi	microCurie
µg/g	micrograms per gram

List of Abbreviations and Acronyms (continued)

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeterr
min	minimum
MINICAMS	miniature chemical abort monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MOGAS	motor vehicle gasoline
MPA	methyl phosphonic acid
MR	molasses residue
MS	matrix spike
mS/cm	milliSiemens per centimeter
MSD	matrix spike duplicate
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
N/A	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
ND	not detected
NFA	No Further Action
NGVD	National Geodetic Vertical Datum
No.	number
NR	not requested
ns	nanosecond
N-S	north to south
nT	nanotesla
NTU	nephelometric turbidity unit
O&G	oil and grease
O&M	operations and maintenance
ºC	degrees Celsius
OD	outside diameter
ºF	degrees Fahrenheit
OE	Ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus pesticide
OWS	oil/water separator
oz	ounce
PAH	polynuclear aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchlorethene
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
POL	petroleum, oils, and lubricants
PP	peristaltic pump
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAP	installation-wide quality assurance plan
QC	quality control
qty	quantity
Qual	qualifier
R	rejected
REG	field sample
RFA	request for analysis
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTK	real-time kinematic
SAD	South Atlantic Division
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone
SFSP	site-specific field sampling plan
SHP	installation-wide safety and health plan
sm	silty sands; sand-silt mixtures
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	sump pump
Ss	stony rough land, sandstone
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSSL	site-specific screening level
STB	supertropical bleach
Std. units	standard units
SU	standard unit
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SZ	support zone
TAL	target analyte list
TB	trip blank
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TN	Tennessee
TOC	top of casing
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
TWA	time weighted average
UCL	upper confidence limit
UCR	upper certified range
UJ	not detected above reporting limit; result should be estimated
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USAMCLS	U.S. Army Chemical School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VQual	validated qualifier
VX	nerve agent (O-ethyl-S- [diisoproplaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards